SESSIONAL PAPERS

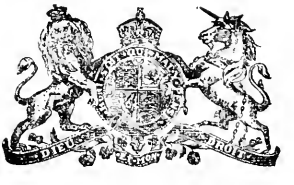
VOLUME 6

FIRST SESSION OF THE TENTH PARLIAMENT

OF THE

DOMINION OF CANADA

SESSION 1905



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OF THE

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5. Supplementary Estimates for the year ending 30th June, 1906. Presented 4th July, 1905, by Hon. W. S. Fielding.....*Printed for both distribution and sessional papers.*

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8. Report of the Superintendent of Insurance, for the year ended 31st December, 1904.
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REPORT, RETURNS AND STATISTICS

OF THE

INLAND REVENUES

OF THE

DOMINION OF CANADA

FOR THE FISCAL YEAR ENDED JUNE 30

1904

PART I. EXCISE, &c.

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
PRINTED BY S. E. DAWSON, PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1904

No. 12—1905.]

To His Excellency the Right Honourable Sir Albert Henry George, Earl Grey, Viscount Howick, Baron Grey of Howick, in the County of Northumberland, in the Peerage of the United Kingdom, and a Baronet: Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, &c., &c., Governor General of Canada.

MAY IT PLEASE YOUR EXCELLENCY:

I have the honour to transmit to Your Excellency the RETURNS AND STATISTICS of Inland Revenues of the Dominion of Canada, for the Fiscal Year ended June 30, 1904, as prepared and laid before me by the Deputy Minister of Inland Revenue.

All of which is respectfully submitted.

L. P. BRODEUR,
Minister of Inland Revenue.

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REPORT

OF THE

DEPUTY MINISTER OF INLAND REVENUE

To the Hon. L. P. Brodeur,
Minister of Inland Revenue.

Sir,—Herewith I have the honour to submit statements of the Inland Revenues collected by this department during the fiscal year ended June 30, 1904, with the usual information as to the cost of collection and statistics respecting the sources whence these revenues were derived.

The following summary comparison shows the accrued revenue for the years ended June 30, 1900, 1901, 1902, 1903 and 1904, respectively :—

	1900.	1901.	1902.	1903.	1904.
	$	$	$	$	$
* Excise	9,931,950	10,423,865	11,257,485	12,19 ,123	13,126,593
Public Works	5,366	4,805	4,749	4,901	4,687
Culling Timber	8,155	8,271			
Weights and Measures, Gas and Law Stamps	78,510	81,987	88,198	109,535	110,416
Electric Light	14,452	15,568	21,062	23,895	23,457
Other Revenues	643	537	592	610	569
Methylated Spirits		73,675	66,785	72,269	68,326
Totals	10,039,076	10,608,708	11,438,871	12,401,333	13,334,048

* 1900 includes Methylated Spirits.

The increase over last fiscal year being $932,715.

DETAILS of Excise Revenue accrued during the undermentioned years :—

	1	2	3	4	5
	1900.	1901.	1902.	1903.	1904.
	$	$	$	$	$
Spirits	4,821,218	5,180,775	5,620,613	6,162,827	6,672,149
Malt Liquor	7,174	6,569	6,970	9,485	9,039
Malt	910,537	977,330	1,077,809	1,029,623	1,137,556
Tabacco	3,281,640	3,337,848	3,563,578	3,904,617	4,127,679
Cigars	825,643	837,434	897,360	998,495	1,070,823
* Petroleum and Acetic Acid	5,505	8,910	8,862	6,128	2,701
Manufactures in bond	30,192	44,242	45,306	45,024	45,343
Seizures	6,071	1,292	1,567	2,830	4,413
Other receipts	34,132	29,465	35,419	40,094	56,889
† Methylated spirits	9,838	73,675	66,785	72,269	68,326
Totals	9,931,950	10,497,540	11,324,269	12,262,392	13,194,918

* Petroleum for 1900. Acetic Acid for 1901, 1902, 1903 and 1904.
† Year 1900 shows only the net revenue over expenditure, and 1901, 1902, 1903 and 1904 represents the gross revenue.

The quantity of spirits produced during the year was 5,678,153 proof gallons, as compared with 4,063,603 proof gallons produced in the previous fiscal year. The raw material used in its production being as follows :—

	Lbs.
Malt	6,130,008
Indian corn	67,240,289
Rye	15,735,254
Wheat	547,175
Oats	690,214
Molasses	7,993,675

The transactions of the several distilleries will be found stated in detail in Appendix A (Statement No. 3), pages 68 and 69.

		Proof Galls.
There were on July 1, 1903, in process of manufacture		117,603
Manufactured during the year		5,678,153
Returned to distilleries for re-distillation—Duty paid	848	
" " " In bond	748,823	
		749,671
Received into distilleries from other sources—Duty paid		7,247
" " " In bond		
Total		6,552,674

This was disposed of as follows:—

	Proof Gallons.
Placed in warehouse under crown lock	6,323,439
Fusel-oil written off	14,898
Deficiency arising from rectification	6,458
Remaining in process of manufacture, June 30, 1904, by actual stock-taking	198,794
Written off	9,085
Total	6,552,674

The following statement shows the warehousing transactions in spirits during the year ended June 30, 1904, and the four preceding years:—

	1	2	3	4	5	6	7	8	9
Fiscal Years.	In Warehouse at beginning of year.	Warehoused during the year. Ex-distillery.	Otherwise housed.	Taken for consumption.	Exported.	Used in Bonded Factories.	Otherwise accounted for.	For Re-Distillation.	In Warehouse at end of year.
	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.
1899-1900	11,820,992	3,113,001	135,196	2,523,576	138,637	345,312	131,222	470,315	11,460,127
1900-1901	11,460,127	3,067,919	155,295	2,707,919	148,154	352,705	212,516	408,477	10,853,570
1901-1902	10,853,570	3,668,286	187,827	2,933,183	151,799	360,235	231,641	469,417	10,563,408
1902-1903	10,563,408	4,953,575	228,601	3,207,748	157,666	418,631	306,220	870,231	10,785,088
Totals	44,698,097	14,802,781	706,919	11,372,426	596,256	1,476,883	881,599	2,218,440	43,662,193
Annual average of four years ended June 30, 1903	11,174,524	3,700,695	176,730	2,843,106	149,064	369,221	220,400	554,610	10,915,548
1903-4	10,785,088	6,323,439	225,329	3,481,287	180,291	405,663	193,851	748,823	12,323,941

It will be of interest to note the gradual development of a foreign demand for Canadian distillery products.

The quantities exported being as follows:—

	Proof Gallons.
1899–1900	138,637
1900–1901	148,154
1901–1902	151,799
1902–1903	157,666
1903–1904	180,291

The following statement exhibits the entire quantities upon which duties were collected during the several years recited therein. The total column will be found to accord with the figures shown in Financial Statement No. 13, page 23 :—

Fiscal Years.	Canadian Spirits.		Imported Spirits used in Bonded Factories. Paid difference between Customs and Excise Duty.	Total quantities upon which duty was collected.	Memorandum of Revenue accrued including License Fees.
	Paid duty Ex-distillery.	Paid duty Ex-warehouse.			
	Pf. Gallons.	Pf. Gallons.	Pf. Gallons.	Pf. Gallons.	$
1899-1900	493	2,523,576	134,969	2,659,038	4,821,218
1900-1901	914	2,707,919	155,117	2,863,950	5,180,775
1901-1902	2 488	2,933,183	187,759	3,123,430	5,620,613
1902-1903	1,019	2,979,268	228,480	3,208,767	6,162,827
Totals	4,914	11,143,946	706,325	11,855,185	21,785,433
Annual average of four years ended June 30, 1903	1,228	2,785,987	176,581	2,963,796	5,446,358
1903-1904	6,458	3,481,287	225,326	3,713,071	6,672,149

The following statement shows the transactions in malt during the year 1903–1904, and the four preceding years :—

Fiscal Years.	1 In Warehouse at beginning of year.	2 Manufactured during the year.	3 Increase by absorption.	4 Taken for consumption.	5 Exported.	6 Otherwise accounted for.	7 In Warehouse at end of year.	8 Memorandum of Revenue accrued, including Licence Fees.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	$
1899–1900.....	21,782,187	61,497,029 (*2,786,630)	730,799	60,284,064	327,950	1,663,296	24,521,335	910,538
1900–1901.....	24,521,335	64,095,899 (*3,565,270)	807,838	64,723,616	310,000	1,882,070	26,074,656	977,330
1901–1902.....	26,074,656	72,870,605 (*3,600,214)	835,511	71,440,519	369,230	1,314,308	30,256,929	1,077,809
1902–1903.....	30,256,929	66,492,160 (*3,596,116)	739,592	67,608,157	287,040	1,735,390	31,454,210	1,020,623
Totals.....	102,635,107	264,955,693 (*13,548,230)	3,113,740	264,056,356	1,294,220	6,595,064	112,307,130	3,986,300
Annual average of four years ended June 30, 1903	25,658,777	66,238,923 (*3,387,057)	778,435	66,014,089	323,555	1,648,766	28,076,782	996,575
1903–04.....	31,454,210	68,563,928 (*4,158,218)	623,592	75,430,347	376,936	2,253,306	26,679,359	1,137,556

* Imported.

Tobacco :

The following Statement shows the transactions during the Fiscal Years ended June 30, 1900, 1901, 1902, 1903 and 1904 respectively, in Tobacco, Snuff and Cigarettes.

Fiscal Years.	1	2	3	4	5	6	7	8	9	10
	In Warehouse, July 1, 1903.	Manufactured during the year.	Taken for consumption.	Exported.	Otherwise accounted for.	In Warehouse, June 30, 1904.	Raw Leaf taken for consumption.	Canadian Twist taken for consumption.	Total Tobacco taken for consumption.	Duty collected thereon, including License Fees.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	$
1899 1900	1,623,191	11,146,218	11,406,124	170,185	60,105	1,432,998	9,352,535	58,914	20,517,573	3,281,639
1900 1901	1,432,998	11,943 805	11,636,900	392,614	49,285	1,298,001	9,848,804	57,597	21,543,301	3,337,848
1901 1902	1,298 004	12,054,467	11,900,051	222,355	53,193	1,176,869	10,704,962	72,286	22,677,302	3,563,578
1902 1903	1,176,869	13,371,321	12,983,995	141,209	79,923	1,343,063	11,615,963	53,256	24,653,214	3,904,617
Totals	5,531,065	48,515,811	47,627,073	926,363	242,506	5,250,931	41,522,264	242,053	89,391,390	14,087,682
Average for four years ended June 30, 1903	1,382,766	12,128,953	11,906,768	231,591	60,626	1,312,734	10,380,566	60,513	22,347,847	3,521,920
1903 1904	1,343,063	13,488,306	13,160,660	163,829	69,329	1,437,551	12,139,700	47,771	25,348,131	4,127,679

CIGARS :

The following statement shows the transactions in Cigars during the fiscal year ended June 30, 1904, and the four preceding years :

Fiscal Years.	1 In Warehouse July 1, 1903.	2 Manufactured during the Year.	3 Assessment to bring production up to Standard.	4 Taken for Consumption.	5 Exported.	6 Otherwise accounted for.	7 In Warehouse June 30, 1904.	8 Memorandum of Revenue accru'd including License Fees.
	No.	No.	No.	No.	No.	No.	No.	$
1899 1900	15,776,235	139,389,177	8,430	138,041,707	189,975	17,300	16,925,160	825,613
1900 1901	16,925,160	141,130,451	7,660	141,096,889	158,450	59,500	17,018,435	837,134
1901 1902	17,018,435	156,686,795	4,096	151,780,516	128,845	7,150	21,822,815	897,360
1902 1903	21,822,815	171,996,232	81,875	168,290,122	190,920	662,150	24,760,130	998,195
Totals	71,572,645	609,502,958	105,061	599,209,534	668,190	746,400	80,526,540	3,558,932
Annual average of four years ended June 30, 1903	17,893,161	152,375,739	26,265	149,802,383	167,047	186,600	20,139,135	889,733
1903 1904	24,760,130	183,018,907	15,715	180,185,202	278,450	123,900	26,937,230	1,070,823

The revenue derived from goods manufactured in bond during the past five years has been as follows :—

1899–1900	$ 30,192
1900–1901	44,242
1901–1902	45,306
1902–1903	45,024
1903–1904	45,343

Acetic Acid :

The revenue derived from acetic acid during the last five years has been as follows :—

1899–1900	$ 9,647
1900–1901	8,910
1901–1902	8,862
1902–1903	6,128
1903–1904	2,701

Inspection of Petroleum :

The quantity of Canadian Petroleum and Naphtha inspected during the year was as follows :—

	Gallons.
Petroleum	6,526,897
Naphtha	765,216
Total	7,292,113

Public Works :

The revenue accrued from this source was as follows :

	1902–1903.	1903–1904.
Hydraulic and other rents	$ 3,654 00	$ 3,647 00
Minor public works	1,247 50	1,040 50

Weights and Measures, Gas and Electric Light :

The usual special reports in relation to these services have been prepared, containing full statistical information.

The aggregate revenue accrued from these services was $116,867.76.

The cost of the three services being $118,194.97.

Prevention of Adulteration of Food and Agricultural Fertilizers :

The usual supplementary report in relation to this service will be submitted containing details of the work done and the report of the analysts.

METHYLATED SPIRITS :

The quantity of methylated spirits manufactured during the year, was 87,745 proof gallons ; 87,620 gallons were sold. A statement of details appears on pages 62, 63 and 109.

Appendix A shows the consumption of, and revenue derived annually from, spirits, tobacco and other goods subject to Excise, and of similar goods subject to duties of Customs, per head of the population of the Dominion.

Appendix B contains, as usual, the details concerning illicit stills seized during the year.

Appendix C shows the amount of Excise Revenue collected at each out-office and under various headings, separately.

I have the honour to be, sir,

Your obedient servant,

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
Ottawa, August 19, 1904.

APPENDIX A

TABLE showing the Annual Consumption per head of the undermentioned articles paying Excise and Customs Duties, and the Revenue per head derived annually.

DOMINION OF CANADA.

YEARS.	Quantity.					Duty.				
	Spirits.	Beer.	Wine.	Tobacco.	Petroleum.	Spirits.	Beer.	Wine.	Tobacco.	Petroleum.
	Galls.	Galls.	Galls.	Lbs.	Galls.	$	$	$	$	$
1869	1·124	2·290	·115	1·755	·575	·761	·092	·037	·193	·041
1870	1·434	2·163	·195	2·190	1·103	·962	·085	·049	·259	·061
1871	1·578	2·490	·259	2·052	1·591	1·059	·095	·056	·236	·077
1872	1·723	2·774	·257	2·481	1·302	1·160	·108	·070	·422	·076
1873	1·682	3·188	·238	1·999	1·387	1·135	·120	·066	·350	·084
1874	1·994	3·012	·288	2·566	1·618	1·363	·119	·086	·442	·103
1875	1·394	3·091	·149	1·995	1·589	1·127	·114	·069	·428	·098
1876	1·204	2·454	·177	2·316	1·360	1·182	·098	·075	·513	·105
1877	·975	2·322	·096	2·051	1·103	·949	·109	·057	·446	·084
1878	·960	2·169	·096	1·976	.....	·927	·147	·052	·439	.....
1879	1·131	2·209	·104	1·954	.....	1·005	·125	·057	·449	....
1880	·715	2·248	·077	1·936	.....	·772	·081	·055	·428	.....
1881	·922	2·293	·099	2·035	.....	·990	·081	·073	·443	.....
1882	1·009	2·747	·120	2·150	.....	1·084	·098	·092	·485	.....
1883	1·090	2·882	·135	2·280	.....	1·186	·103	·097	·473	.....
1884	·908	2·924	·117	2·476	.....	1·074	·104	·082	365	.....
1885	1·126	2·639	·109	2·623	.....	1·198	·111	·074	·393	.....
1886	·711	2·839	·110	2·052	.....	1·007	·091	·074	·502	.....
1887	·746	3·084	095	2·062	.....	1·045	·100	·066	514	.....
1888	·645	3·247	·094	2·093	.....	·944	110	·066	·509	.....
1889	·776	3·263	·097	1·153	.....	1·107	·114	·068	·529	.....
1890	·883	3·360	·104	2·143	.....	1·257	·121	·072	·539	.....
1891	·745	3·790	·111	2·292	.....	1·094	·137	·080	·590	.....
1892	·701	3·516	·101	2·291	.....	1·156	·211	·075	·680	.....
1893	·740	3·485	·094	2·314	.....	1·235	·218	·070	·691	.....
1894	·742	3·722	·089	2·264	.....	1·235	·205	·060	683	.....
1895	·666	3·471	·090	2·163	.....	1·124	·161	·056	·645	.....
1896	·623	3·528	070	2·120	.....	1·159	·164	·047	·639	.....
1897	·723	3·469	·084	2·243	.....	1·341	·213	·041	·671	.....
1898	·536	3·808	·082	2·358	.....	1·306	126	·041	·615	.....
1899	·661	3·995	·086	2·174	.....	1·367	·174	·045	·841	.....
1900	·701	4·364	·085	2·300	.....	1·455	·185	·044	·853	.....
1901	·765	4·737	·100	2·404	.....	1·593	·198	·048	·875	.....
1902	·796	5·102	·090	2·404	.....	1·653	·214	·048	·915	.....
1903	·870	4·712	·096	2·548	.....	1·812	·205	·051	·992	.....
1904	·952	4·918	·096	2·765	.....	1·985	·225	·051	1·042	.....
Average	·973	3·231	·122	2·194	.....	1·189	·138	·062	·561	.....

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
Ottawa, August 19, 1904.

APPENDIX B

Statement of Seizures of Illicit Manufactures for Fiscal Year ended June 30, 1904.

Divisions.	Number.	Dates.	Names.	Residences.	Schedule Value.	Remarks.
					$ cts.	
Quebec	530	Oct. 17, 1903	L. L. Thibeaudeau & Cie.	St. Malo, Que	542 76	Dept. of Justice for prosecution.
"	531	" 20 "	Nap. Dion	Quebec, Que	156 15	" "
"	532	" 20 "	V. Miville	Anqui, Que	3 00	Property confiscated.
"	533	" 20 "	Nap. Dion	Quebec, Que	29 02	Spirits confiscated. Refers to Seizure No. 531.
"	533a	Jan. 28, 1904	Louis Emond	Pointe-aux-Boulleaux	6 00	Property confiscated.
"	537	Feb. 25 "	J. Laverdière	St. Raphael	5 00	" "
"	538	" 25 "	Max. Beaudoin	"	1 68	Property destroyed.
St. John, N.B.	114	Dec. 26, 1903	M. Maher	St. John, N.B	50 00	Penalty of $300, paid.
"	116	May 31, 1904	G. Gautreau	Acadieville	3 00	Fined $250, and 6 months imprisonment.
Halifax	187	July 15, 1903	T. Kent & R. S. Banks	Halifax	47 97	Fined $300.
"	188	" 15 "	R. S. Banks (in stables of)	"	9 99	Fined $300, paid.
Pictou, N.S.	105	" 15 "	Unknown	Pictou	40 00	No prosecution, owner unknown.
"	106	" 25 "	J. McDonald	Brown Mountains	43 25	Fined $100, paid.
"	107	Aug. 4 "	J. N. Morgan	Poplar Hill	12 00	Fined $100, paid.

Inland Revenue Department,
Ottawa, August 19, 1904.

W. J. GERALD,
Deputy Minister.

APPENDIX C

STATEMENT showing the Amount of Excise and other Revenues collected at each of the undermentioned Out-Offices, during the Fiscal Year ended June 30, 1904.

Divisions.	Out-Offices.	Licenses.	Spirits.	Malt Liquor	Malt.	Tobacco.	Cigars.	Manufactures, in Bond.	Other Receipts.	Electric Light Inspection Fees.	Totals.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Belleville	Deseronto	20 00	3,022 64			2,018 00					5,060 64
	Picton	20 00	1,830 63							25 00	1,875 63
	Trenton	20 00	5,842 63								5,862 63
Brantford	Embro									5 00	5 00
	Ingersoll	150 00				166 20	1,620 30			25 00	2,261 50
	Norwich	50 00						1,512 59	600 00	10 00	2,172 59
	Paris									10 00	10 00
	Port Dover	50 00						126 62	204 22	5 00	385 84
	Port Rowan									5 00	5 00
	Simcoe									5 00	5 00
	Tilsonburg	100 00			924 84					10 00	1,034 84
	Woodstock	145 00	3,227 84		2,508 35	686 70	1,902 60			25 00	8,495 49
Guelph	Berlin	495 00	57,310 61		12,000 00	8,986 28	17,423 91		12 00	25 00	96,282 80
	Galt	525 00			6,258 78	880 80	2,876 85		102 78	25 00	10,669 21
	New Hamburg	50 00			3,715 50					5 00	3,770 50
	Preston	250 00			3,225 36	626 90	2,350 80		96 06	10 00	6,559 12
	Salem	50 00									50 00
	Waterloo	575 00	463,554 25		28,740 00	1,678 40	6,495 00		8,871 21	25 00	509,941 86
Hamilton	Dundas	200 00			52,481 25					10 00	52,691 25
	Greensville	150 00			1,503 60						4,653 60
Kingston	Napanee	40 00	8,617 74			1,496 75				35 00	10,189 46
London	Alvinston									5 00	5 00
	Aylmer									10 00	10 00
	Dutton									10 00	10 00
	Forest									10 00	10 00
	Glencoe									10 00	10 00
	Lucan									5 00	5 00
	Parkhill									10 00	10 00
	Petrolea	21 00	6,610 14							25 00	6,656 14
	Sarnia	186 00	28,411 81		1,719 75	11,845 73	231 00		6 63	25 00	42,425 92
	St. Thomas	312 50				3,321 90	11,141 05			25 00	14,800 45
	Strathroy	120 00	1,229 54		4,980 00				102 78	25 00	6,457 32
	Watford									5 00	5 00
	West Lorne									5 00	5 00
Owen Sound	Collingwood	80 00	1,999 29			18,821 75				25 00	20,929 64
	Kincardine								476 26	10 00	486 26

	Meaford	40 00	888 81			1,123 87					5,052 68
	Walkerton	100 00			4,280 31				508 05	10 00	1,798 39
	Wiarton		1,982 43						47 44		2,029 87
Perth	Arnprior	40 00	9,363 79							25 00	9,428 79
	Eganville	20 00	2,051 34			3,100 75				10 00	5,482 09
	Carleton Place	20 00	1,272 65								1,292 65
	North Bay	40 00	10,351 17							10 00	10,401 17
	Pembroke	115 00	7,033 86			10,400 54	1,418 52			25 00	18,992 92
	Renfrew	40 00	8,502 37							35 00	8,577 37
	Sturgeon Falls	20 00	12,207 31							10 00	12,237 31
	Sudbury	20 00	12,791 93							20 00	12,831 93
Peterborough	Campbellford	40 00	2,407 72								2,447 72
	Cobourg	70 00	7,653 59							15 00	7,768 59
	Lindsay									35 00	35 00
	Port Hope	140 00	3,193 69		8,102 89					10 00	11,446 58
Port Arthur	Waboigoon	20 00	3,271 62								3,291 62
Prescott	Brockville	345 00	5,882 37		6,104 37	1,032 98	3,732 60			25 00	17,122 32
	Gananoque	40 00	3,887 79							25 00	3,952 79
	Beamsville									5 00	5 00
St. Catharines	Dunnville	95 00	1,598 40			238 50	324 30		7 80	10 00	2,274 00
	Fort Erie								50 00		50 00
	Grimsby									5 00	5 00
	Humberstone	75 00				83 16	278 70				436 86
	Merritton									10 00	10 00
	Niagara								30 00	10 00	40 00
	Niagara Falls	75 00				326 50	1,042 50			25 00	1,469 00
	Port Colborne	100 00			4,789 50						4,889 50
	Port Dalhousie									10 00	10 00
	Queenston								10 00		10 00
	Thorold									10 00	10 00
	Welland	75 00				85 50	331 20			10 00	501 70
Stratford	Goderich	145 00	1,267 84		1,350 00					25 00	2,787 84
	Listowel	125 00			3,145 08	937 20	3,529 50				7,736 78
	Palmerston	220 00			46,498 95				12 75		46,761 70
	St. Mary's		372 81			256 50					629 31
Toronto	Barrie	200 00			3,447 27						3,647 27
	Hornby	100 00			3,321 99						3,421 99
	Orillia	100 00			690 39						790 39
	Sault Ste. Marie	240 00	10,653 17		5,722 50	1,580 68	929 55				22,125 90
Windsor	Chatham	165 00	28,305 08		378 00	846 82	2,790 99			25 00	32,510 89
	Kingsville	32 50				36 92	85 50			10 00	164 92
	Leamington	307 50				1,014 36	3,630 48			10 00	7,962 34
Joliette	Berthierville	250 00	10,708 37						5,463 08		16,421 45
	L'Epiphanie	115 00				757 25	5,685 51				6,557 76
Montreal	St. Jérôme	115 00	35,912 85			400 13	1,213 80				37,642 08
	Valleyfield	40 00	33,717 69				108 00				33,865 69
Quebec	Gaspé	60 00	1,785 88			704 37					2,550 25
	Fraserville	135 00	6,943 62							25 00	7,103 62
	Paspébiac	20 00				87 50					107 50
	Rimouski	75 00	1,994 40				78 60				2,148 00

APPENDIX C—*Concluded.*

STATEMENT showing the Amount of Excise and other Revenues collected at each of the undermentioned Out-Offices, during the Fiscal Year ended June 30, 1903—*Concluded.*

Divisions.	Out-Offices.	Licenses.	Spirits.	Malt Liquor.	Malt.	Tobacco.	Cigars.	Manufactures in Bond.	Other Receipts.	Electric Light Inspection Fees.	Totals.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Sherbrooke	Granby	240 00				134,249 52	22,572 72				157,062 24
	Lake Megantic		4,824 24								4,824 24
St. Hyacinthe	Sorel	100 00	45,620 14							10 00	45,730 14
	St. John's, Que.	110 00	37,392 02					3,315 67	601 55	25 00	41,444 24
	Victoriaville	40 00	24,957 74							35 00	25,032 74
Three Rivers	Louiseville	20 00	8,607 36								8,627 36
St. John	Campobello	20 00	1,198 72								1,218 72
	Chatham	20 00				9,351 00				25 00	9,396 00
	Claire		75 53								75 53
	Fredericton	20 00				15,306 50				10 00	15,336 50
	Moncton	40 00				14,680 00			1 00	25 00	14,746 00
	Newcastle	20 00	57 00			2,957 50				10 00	3,044 50
	Sackville	20 00				2,231 88			1 00	10 00	2,262 88
	Sussex	20 00				2,319 00				10 00	2,349 00
	St. Stephens	20 00				3,580 75				10 00	3,610 75
	Woodstock	40 00	513 77			465 00				15 00	1,033 77
Halifax	Amherst	20 00	2,575 54			1,695 00				25 00	4,315 54
	Truro	20 00				12,182 25				25 00	12,227 25
	Yarmouth	135 00				7,324 95	613 80			5 00	8,078 75
Pictou	Antigonish	40 00				3,351 50				10 00	3,401 50
	New Glasgow	20 00				10,091 25				25 00	10,136 25
	North Sydney	20 00				4,932 75				50 00	5,002 75
	Sydney	20 00	8,777 45							50 00	8,847 45
Charlottetown	Montague									5 00	5 00
	Summerside									10 00	10 00
Calgary	Edmonton	335 00	16,931 54		3,625 17	6,894 45	1,263 15		86 30	25 00	29,160 61
	Fort Saskatchewan	10 00	935 64								945 64
	Lethbridge	130 00	1,867 42		2,582 35	2,959 75				10 00	7,549 52
	Macleod	20 00	2,043 60			320 50					2,384 10
	Maple Creek	20 00	426 21								446 21
	Pincher Creek	20 00	544 12			425 05	177 90				564 12
	Wetaskiwin	115 00	5,394 54			425 05	177 90				6,112 49
Winnipeg	Boissevain									5 00	5 00
	Brandon	320 00	49,752 87		4,033 41	4,487 10	5,211 30			25 00	63,829 68
	Carman									5 00	5 00
	Fort Francis	20 00	860 20								880 20

	Gretna	20 00	5,892 21			157 50					6,069 71
	Minnedosa									5 00	5 00
	Morden	20 00	6,825 36							10 00	6,855 36
	Neepawa									10 00	10 00
	Portage la Prairie	115 00	29,640 54			2,889 93	717 90			25 00	33,388 37
	Prince Albert	70 00	1,873 19		1,170 00					5 00	3,418 19
	Rainy River	20 00	4,295 94								4,315 94
	Rat Portage	60 00	21,100 68			2,741 50				25 00	23,927 18
	Regina	20 00	5,919 71							10 00	5,949 71
	Selkirk	20 00	3,371 25							10 00	3,401 25
	Virden	20 00	5,022 39								5,042 39
Vancouver	Armstrong	25 00			30 00						55 00
	Atlin	50 00			66 14						116 14
	Cranbrook	115 00	10,865 19		179 34	874 13					12,033 66
	Fernie	195 00	13,836 89		7,860 00	164 50	490 76				22,547 15
	Golden	20 00	3,393 65								3,413 65
	Grand Forks	120 00	5,502 95		730 05						6,353 00
	Greenwood	120 00	7,968 36		1,313 40						9,401 76
	Headley	25 00									25 00
	Kamloops	125 00			617 09	1,287 00	3,883 25				5,942 34
	Kaslo		67 39								67 39
	Kelowna	85 00				39 52	76 95				201 47
	Morrisey	50 00			330						380 00
	Moyie City	50 00									50 00
	Nelson	340 00	27,573 15		3,074 51	614 30	2,435 10				34,037 06
	New Westminster	295 00	3,178 95	821 00	2,149 96	1,206 60	3,516 00		50 00		11,217 51
	Phoenix	50 00			70 35						120 35
	Revelstoke	265 00	8,431 49		932 04	946 20	671 40				11,246 13
	Rossland	195 00	9,850 03		3,291 07	289 00	771 00				14,399 10
	Sandon	50 00			996 38						1,046 38
	Trail	50 00			845 01						895 01
	Vernon	65 00				125 32	165 52				355 84
	Ymir	50 00			180 00						230 00
Victoria	Ladysmith	20 00	35 60								55 60
	Nanaimo	320 00	4,446 16	116 60	8,555 03	686 50	2,176 05		13 00		16,313 34
	Grand Totals	12,624 50	1,200,136 37	937 60	251,853 01	334,973 94	113,964 06	4,954 88	17,386 91	1,500 00	1,938,331 27

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT.
OTTAWA, August 19th, 1904.

FINANCIAL RETURNS, 1903-1904

DR. No. 1.—GENERAL REVENUES ACCOUNT, 1903-1904. CR.

Memo. of Refunds deducted below.	Amounts deposited to the credit of the Receiver General.	Balances due June 30, 1904.	Totals.	Services.	Revenues of previous years not collected July 1, 1903.	Revenues accrued 1903-1904.	Totals.
$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.
232,753 61	13,127,549 61	13,671 39	13,141,221 00	Excise and Seizures, per Statement No. 3	14,628 41	13,126,592 56	13,141,221 00
..	3,658 00	27,839 17	31,497 17	Hydraulic and other rents, per Statement No. 5	27,850 17	3,647 00	31,497 17
..	836 75	12,602 16	13,438 91	Minor Public Works, per Statement No. 6	12,398 41	1,040 50	13,438 91
..	66,355 19	188 04	66,543 23	Weights and Measures, per Statements Nos. 19(A) and 19(B)	92 72	66,450 51	66,543 23
..	26,960 00	..	26,960 00	Gas Inspection, per Statement No. 21	..	26,960 00	26,960 00
1 00	23,258 75	198 50	23,457 25	Electric Light Inspection, per Statement No. 23	..	23,457 25	23,457 25
..	17,006 31	..	17,006 31	Law Stamps, per Statements Nos. 10 and 18	..	17,006 31	17,006 31
..	..	45 04	45 04	Bill Stamps, per Statement No. 9	45 04	..	45 04
..	568 63	..	568 63	Sundry Minor Revenues, per Statement, No. 11	..	568 63	568 63
..	68,325 69	..	68,325 69	Methylated Spirits, per Statement No. 25	..	68,325 69	68,325 69
232,754 61	13,334,518 93	..	13,389,063 23		..	13,334,048 45	13,389,063 23
..	232,754 61	..	232,754 61	....Less—Refunds as per Statement No. 16	..	232,754 61	232,754 61
..	13,101,764 32	54,544 30	13,156,308 62	.....Totals	55,044 78	13,101,293 84	13,156,308 62

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

W. J. GERALD,
Deputy Minister.

DR. No. 2.—GENERAL EXPENDITURES

Balances due to Collectors, &c., July 1, 1903.	Expenditures Authorized by the Department.			Balances due by Collectors, &c., June 30, 1904.	Totals.	Services.
	Salaries.	Contingencies.	Seizures.			
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	
49 08	342,556 02	117,662 79	704 71	343 98	461,316 58	Excise and Seizures, per Statement No. 4
			2,545 91		2,545 91	Excise Seizures, distributed per Statement No. 4 and Appendix B
	2,649 72	8,847 62			11,497 34	Preventive Service, per Statement No. 7
	8,617 71	12,376 84			20,994 55	Adulteration of Food, per Statement No. 8 and Appendix B.
		33 41			33 41	Sundry Minor Expenditures, per Statement No. 12
	44,792 11	6,438 22		16 66	51,246 99	Departmental Expenditures, per Statement No. 17
	57,565 27	27,203 55		193 26	84,962 08	Weights and Measures, per Statements Nos. 20 (A) and 20 (B)
	18,571 49	6,807 66		212 88	25,592 03	Gas Inspection, per Statement No. 22
	3,931 12	4,115 88			8,047 00	Electric Light Inspection, per Statement No. 24
	3,770 39	46,874 67			50,645 06	Methylated Spirits, per Statement No. 25
49 08	482,453 83	230,360 64	3,250 62	766 78	716,880 95	Totals

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

SESSIONAL PAPER No. 12

ACCOUNT, 1903–1904. CR.

Balances due by Collectors, &c., July 1, 1903.	Amounts disbursed by the Receiver-General, on requisitions of the Department.	Deductions from Salaries for				Balances due to Collectors, &c., June 30, 1904.	Totals.
		Superannuation.	Insurance.	Retirement.	Guarantee.		
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
343 98	449,487 56	4,923 02	103 08	5,155 17	1,254 69	49 08	461,316 58
. . . . .	2,545 91	. . . .	. . . . .	. . . . .	. . . . .	. . . . .	2,545 91
. . . . .	11,491 58	. . . . .	. . . . .	. . . . .	5 76	. . . . .	11,497 34
. . . . .	20,879 59	114 96	. . . .	. . . . .	. . . . .	. . . . .	20,994 55
. . . . .	33 41	. . . . .	. . . . .	. . . . .	. . . .	. . . .	33 41
16 66	50,229 87	624 96	116 40	259 10	. . . . .	. . . . .	51,246 99
193 26	84,223 64	338 86	48 72	. . . . .	157 60	. . . . .	84,962 08
212 88	25,100 17	161 04	. . . . .	5 00	112 94	. . . . .	25,592 03
. . . . .	8,045 13	. . . . .	. . . . .	. . . .	1 87	. . . . .	8,047 00
. . . . .	50,553 40	. . . . .	. . . . .	91 66	. . . . .	. . . . .	50,645 06
766 78	702,590 26	6,162 84	268 20	5,510 93	1,532 86	49 08	716,880 95

W. J. GERALD,
Deputy Minister.

4-5 EDWARD VII., A. 1905

EXCISE,

No. 3.—Collection Divisions

Dr. *(For Details, see*

Balances due July 1, 1903.	Amount Accrued during the Year, including License Fees.							
	Spirits.	Malt Liquor.	Malt.	Tobacco.	Cigars.	Acetic Acid.	Bonded Manufactures.	Seizures.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
.....	123,368 48	50 00	5,241 95	3,950 25	3,600 00	.....	.....	75 00
112 61	32,215 13	200 00	11,267 19	8,885 40	26,189 70	.....	1,743 43	.....
.....	8,935 38	.....	.....	9 00	.....	.....	.....	.....
.....	537,244 82	400 00	83,893 64	15,834 73	31,859 61	.....	.....	.....
.....	261,425 42	150 00	79,731 80	462,986 34	86,672 83	.....	4,853 64	10 00
.....	78,248 85	100 00	43,743 58	18,223 52	15,022 35	.....	2,443 77	50 00
.....	71,001 25	300 00	71,337 20	92,560 51	188,054 64	.....	.....	.....
.....	283,147 12	175 00	8,100 79	38,059 81	2,983 50	.....	56 54	50 00
.....	25,561 63	300 00	21,126 71	39,195 42	3,707 88	.....	.....	.....
.....	89,794 89	.....	100 20	13,801 39	1,493 52	.....	.....	.....
.....	48,019 58	150 00	14,828 16	171 00	886 20	.....	.....	.....
.....	35,152 13	50 00	1,718 30	4,081 95	169 50	.....	.....	.....
.....	105,314 45	100 00	21,442 45	1,042 98	3,957 60	.....	300 00	.....
.....	14,181 58	100 00	16,832 68	2,346 46	8,986 95	.....	.....	100 00
.....	35,398 26	225 00	52,543 91	8,965 82	10,881 99	.....	.....	.....
31 50	826,228 74	700 00	208,683 05	204,279 95	95,162 27	2,256 61	15,576 84	355 00
.....	391,329 29	150 00	45,241 70	18,924 17	10,531 82	.....	700 00	.....
522 89	.....	.....	.....	.....	.....	.....	.....	.....
667 00	2,966,567 00	3,150 00	685,833 31	933,258 70	490,160 36	2,256 61	25,674 22	640 00
.....	62,812 10	50 00	.....	4,986 16	10,346 21	.....	.....	.....
1,784 28	1,647,804 74	500 00	169,374 78	2,212,130 99	358,277 36	444 36	11,147 31	.....
84 30	514,449 14	200 00	57,291 99	125,484 14	42,830 30	.....	338 54	317 59
.....	160,196 93	50 00	20,784 45	142,221 32	45,916 07	.....	300 00	.....
131 58	153,497 65	.....	907 50	3,506 65	14,591 80	.....	4,117 81	.....
.....	70,847 35	.....	.....	794 22	4,421 03	.....	.....	.....
3,295 57	.....	.....	.....	.....	.....	.....	.....	.....
5,295 73	2,609,907 91	800 00	248,358 72	2,489,123 48	476,382 77	444 36	15,903 66	317 59
75 00	148,114 57	100 00	20,777 43	105,832 31	14,969 79	.....	1,841 26	1,538 00
1,442 62	.....	.....	.....	.....	.....	.....	.....	.....
1,517 62	148,114 57	100 00	20,777 43	105,832 31	14,969 79	.....	1,841 26	1,538 00
.....	63,098 09	150 00	44,876 16	88,469 80	3,718 89	.....	.....	343 00
.....	8,777 45	.....	.....	24,648 46	.....	.....	.....	350 00
5,860 50	.....	.....	.....	.....	.....	.....	.....	.....
5,860 50	71,875 54	150 00	44,876 16	113,118 26	3,718 89	.....	.....	693 00
.....	129 26	.....	.....	54,929 45	.....	.....	.....	.....
.....	517,380 31	325 00	50,186 12	296,959 06	45,914 94	.....	1,924 14	.....
.....	58,864 54	200 00	25,096 46	12,649 15	3,254 92	.....	.....	25 00
.....	576,244 88	525 00	75,282 58	309,608 21	49,169 86	.....	1,924 14	25 00

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in Account with Revenue.

Appendix A.) CR.

Other Receipts.	Total Duties Accrued.	Total Debits.	DIVISIONS.	Deposited to the credit of the Receiver General.	Balances due June 30, 1904.	Total Credits.
$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.
700 00	136,985 68	136,985 68	Belleville	136,985 68		136,985 68
840 00	81,340 85	81,453 46	Brantford	81,340 85	112 61	81,453 46
85 00	9,029 38	9,029 38	Cornwall	9,029 38		9,029 38
8,382 72	677,615 52	677,615 52	Guelph	677,615 52		677,615 52
2,898 85	898,728 88	898,728 88	Hamilton	898,728 88		898,728 88
453 00	158,285 07	158,285 07	Kingston	158,285 07		158,285 07
182 60	423,436 20	423,436 20	London	423,436 20		423,436 20
278 75	332,851 51	332,851 51	Ottawa	332,851 51		332,851 51
209 00	90,091 64	90,091 64	Owen Sound	90,091 64		90,091 64
473 00	105,663 00	105,663 00	Perth	105,663 00		105,663 00
121 60	64,176 54	64,176 54	Peterborough	64,176 54		64,176 54
120 00	41,291 88	41,291 88	Port Arthur	41,291 88		41,291 88
305 48	132,462 96	132,462 96	Prescott	132,462 96		132,462 96
80 00	42,627 67	42,627 67	St. Catharines	42,627 67		42,627 67
120 00	108,074 98	108,074 98	Stratford	108,074 98		108,074 98
5,956 16	1,359,198 62	1,359,230 12	Toronto	1,359,230 12		1,359,230 12
21,297 54	488,084 52	488,084 52	Windsor	488,084 52		488,084 52
		522 89	Suspense Account		522 89	522 89
42,404 70	5,149,944 90	5,150,611 90	*Ontario*	5,149,976 40	635 50	5,150,611 90
5,503 08	83,697 55	83,697 55	Joliette	83,697 55		83,697 55
3,461 38	4,403,140 92	4,404,925 20	Montreal	4,403,724 29	1,200 91	4,404,925 20
100 00	741,311 50	741,396 00	Quebec	741,364 50	31 50	741,396 00
160 00	369,928 77	369,928 77	Sherbrooke	369,928 77		369,928 77
1,175 10	177,796 51	177,928 09	St. Hyacinthe	177,928 09		177,928 09
120 00	76,182 60	76,182 60	Three Rivers	76,182 60		76,182 60
		3,295 57	Suspense Account		3,295 57	3,295 57
10,819 56	5,852,058 05	5,857,353 78	*Quebec*	5,852,825 80	1,527 98	5,857,353 78
827 35	294,000 71	294,075 71	St. John	294,075 71		294,075 71
		1,442 62	Suspense Account		1,442 62	1,442 62
827 35	294,000 71	295,518 33	*New Brunswick*	294,075 71	1,442 62	295,518 33
360 00	201,015 94	201,015 94	Halifax	201,015 94		201,015 94
100 00	33,875 91	33,875 91	Pictou	33,875 91		33,875 91
		5,860 50	Suspense Account		5,860 50	5,860 50
460 00	234,891 85	240,752 35	*Nova Scotia*	234,891 85	5,860 50	240,752 35
	55,058 71	55,058 71	Charlottetown, *P.E.I.*	55,058 71		55,058 71
921 86	913,611 46	913,611 46	Winnipeg	913,611 46		913,611 46
320 00	100,410 07	100,410 07	Calgary	100,410 07		100,410 07
1,241 86	1,014,021 53	1,014,021 53	*Manitoba and N. W. T.*	1,014,021 53		1,014,021 53

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EXCISE,

No. 3.—Collection Divisions

Dr. *(For Details, see*

Balances due July 1, 1903.	Amount Accrued during the Year, including License Fees.							
	Spirits.	Malt Liquor.	Malt.	Tobacco.	Cigars.	Acetic Acid.	Bonded Manufactures.	Seizures.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1,202 09	173,281 06	3,847 40	38,499 46	82,108 33	25,636 48	.....	....	1,200 00
85 50	108,824 88	416 60	23,112 77	36,731 17	10,785 32	.....	.....	.....
1,287 59	282,105 94	4,264 00	61,612 23	118,839 50	36,421 80	.....	.....	1,200 00
.....	17,203,85	50 00	815 35	2,969 02	.....	.....	.....	....
14,628 44	6,672,148 95	9,039 00	1,137,555 78	4,127,678 93	1,070,823 47	2,700 97	45,343 28	4,413 59
....	80,703 75	.....	73,921 12	77,422 08	0 26	.....	41 28	.....
.....	6,591,445 20	9,039 00	1,063,634 66	4,050,256 85	1,070,823 21	2,700 97	45,302 00	4,413 59

Inland Revenue Department,
Ottawa, August 19, 1904.

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in Account with Revenue—*Concluded.*

Appendix A.)

Cr.

Other Receipts.	Total Duties Accrued.	Total Debits.	Divisions.	Deposited to the credit of the Receiver General.	Balances due June 30, 1903.	Total Credits.
$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.
490 00	325,062 73	326,264 82	Vancouver	325,062 73	1,202 09	326,264 82
190 00	180,060 74	180,146 24	Victoria	180,143 54	2 70	180,146 24
680 00	505,123 47	506,411 06	*British Columbia*	505,206 27	1,204 79	506,411 06
455 12	21,493 34	21,493 34	Yukon	21,493 34		21,493 34
56,888 59	13,126,592 56	13,141,221 00	Totals	13,127,549 61	13,671 39	13,141,221 00
665 12	232,753 61		Less—Refunds as per statement No. 16.			
56,223 47	12,893,838 95		Net Revenue.			

W. J. GERALD,
Deputy Minister.

4-5 EDWARD VII., A. 1905

EXCISE,

Dr. No. 4.—Collection Divisions

Balances due by Collectors, July 1, 1903.	Amounts received from Department to meet Expenditures.	Deductions from Salaries for				Balances due to Collectors, June 30, 1904.	Totals.	Divisions.
		Superannuation.	Insurance.	Retirement.	Guarantee.			
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	
43 98	9,115 50	175 66		43 68	28 08		9,466 90	Belleville
	7,590 45	114 37		83 52	22 08		7,810 42	Brantford
	1,088 30	20 34			3 60		1,112 24	Cornwall
	17,878 84	358 18		43 68	52 56		18,333 26	Guelph
	21,508 19	333 81		277 94	73 44		22,193 38	Hamilton
	8,373 69	117 42		25 30	25 98		8,542 39	Kingston
	20,059 67	344 28	71 76	174 71	59 06		20,709 48	London
	8,111 12	76 58		220 14	29 52		8,437 36	Ottawa
	5,749 50	68 22		45 54	15 84		5,879 10	Owen Sound
	7,825 97	51 42		228 60	38 88		8,144 87	Perth
	3,609 82	30 00		102 10	12 96		3,754 88	Peterborough
	1,346 66	20 34		7 20	6 39		1,380 59	Port Arthur
	10,065 66	113 22		151 89	34 91		10,365 68	Prescott
	4,867 81	104 80		37 50	18 72		5,028 83	St. Catharines
	6,774 98	72 61		115 32	21 93		6,984 84	Stratford
	39,105 30	570 05	31 32	582 38	128 53		40,417 58	Toronto
	21,093 23	282 98		330 78	78 84	49 08	21,834 91	Windsor
	8,491 71	93 92			27 00		8,612 63	District Inspectors
43 98	202,656 40	2,948 20	103 08	2,470 28	678 32	49 08	208,949 34	*Ontario*
	6,525 06	30 00		216 52	21 96		6,793 54	Joliette
	43,800 42	497 72		890 98	163 03		45,352 15	Montreal
	17,909 84	201 88		168 32	48 43		18,328 47	Quebec
	6,721 71	57 72		165 74	24 48		6,969 65	Sherbrooke
	11,191 26	86 56		246 00	39 11		11,562 93	St. Hyacinthe
	2,741 50	42 60		8 82	8 16		2,801 08	Three Rivers
	5,431 25	46 60		125 00	18 00		5,620 85	District Inspectors
	94,321 64	963 08		1,821 38	323 17		97,428 67	*Quebec*
	8,955 30	139 38		60 00	32 40		9,187 08	St. John
	2,830 50	50 00			9 00		2,889 50	District Inspector
	11,785 80	189 38		60 00	41 40		12,076 58	*New Brunswick*
	11,519 07	226 62			38 16		11,783 85	Halifax
	2,683 16	20 34		68 88	9 36		2,781 74	Pictou
	14,202 23	246 96		68 88	47 52		14,565 59	*Nova Scotia*
100 00	2,270 20	44 56			6 48		2,421 24	*Charlottetown, P.E.I.*
200 00	17,605 13	206 66		224 32	52 40		18,288 51	Winnipeg
	5,613 23	49 04		61 68	14 64		5,738 59	Calgary, N.W.T.
	3,583 85	50 00			9 00		3,642 85	District Inspector
200 00	26,802 21	305 70		286 00	76 04		27,669 95	*Manitoba and N.W.T.*

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1903–1904.

in Account with Expenditures. CR.

Balances due to Collectors, July 1, 1903.	Expenditures Authorized by the Department.						Balances due by Collectors, June 30, 1904.	Totals.
	Salaries.	Seizures Expenditure.	Special Assistance	Rent.	Travelling Expenses.	Sundries.		
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
.....	8,982 34	3 55	.....	.....	209 05	167 98	43 98	9,406 90
.....	6,607 13	.....	649 59	.....	405 75	147 95	.....	7,810 42
.....	1,019 94	.....	.....	.....	0 50	91 80	.....	1,112 24
.....	17,321 14	.....	.....	136 92	409 20	466 00	.....	18,333 26
.....	21,523 91	.....	291 66	.....	111 65	266 16	.....	22,193 38
.....	7,225 48	3 00	41 66	405 00	443 85	423 00	.....	8,542 39
.....	19,486 02	.....	619 92	60 00	145 45	398 09	.....	20,709 48
.....	8,242 47	.....	.....	.....	9 18	185 71	.....	8,437 36
.....	5,261 08	.....	.....	125 00	338 85	154 17	.....	5,879 10
.....	7,544 88	.....	.....	120 00	193 14	316 85	.....	8,144 87
.....	3,542 50	.....	.....	.....	106 55	105 83	.....	3,754 88
.....	1,165 10	.....	.....	.....	110 90	104 59	.....	1,380 59
.....	9,561 54	.....	416 60	.....	30 07	357 40	.....	10,365 68
.....	4,652 38	13 55	.....	48 00	169 75	145 15	.....	5,028 83
.....	5,946 95	.....	.....	.....	446 80	591 09	.....	6,984 84
.....	38,811 87	.....	199 98	60 00	765 25	580 48	.....	40,417 58
49 08	20,793 38	.....	349 96	71 00	327 84	244 15	.....	21,834 91
.....	7,099 96	.....	.....	150 00	1,269 09	153 58	.....	8,672 63
49 08	194,788 07	20 10	2,569 37	1,175 92	5,461 85	4,900 97	43 98	208,949 34
.....	5,834 92	.....	349 92	.....	83 10	525 60	.....	6,793 54
.....	40,823 72	.....	2,951 70	.....	762 70	814 03	.....	45,352 15
.....	13,067 83	81 05	3,833 38	50 00	691 14	605 07	.....	18,328 47
.....	6,207 44	34 50	.....	.....	508 34	219 27	.....	6,969 65
.....	8,699 29	.....	1,967 09	144 00	91 85	660 70	.....	11,562 93
.....	2,306 69	.....	414 94	.....	9 75	69 70	.....	2,801 08
.....	4,831 13	.....	.....	.....	734 69	55 03	.....	5,620 85
.....	81,771 02	115 55	9,517 03	194 00	2,881 57	2,949 50	.....	97,428 67
.....	8,297 34	525 93	.....	.....	117 64	246 47	.....	9,187 08
.....	2,500 00	.....	.....	.....	375 94	13 56	.....	2,889 50
.....	10,797 34	525 93	.....	.....	493 58	259 73	.....	12,076 58
.....	11,353 50	21 55	.....	.....	158 97	249 83	.....	11,783 85
.....	2,399 94	21 58	.....	.....	162 27	197 95	.....	2,781 74
.....	13,753 44	43 13	.....	.....	321 24	447 78	.....	14,565 59
.....	2,230 00	.....	.....	.....	17 95	73 29	100 00	2,421 24
.....	14,552 12	.....	2,508 60	180 00	507 65	340 14	200 00	18,288 51
.....	3,233 32	.....	558 22	90 00	1,572 65	285 00	.....	5,738 59
.....	2,500 00	.....	.....	.....	1,059 50	83 35	.....	3,642 85
.....	20,285 44	.....	3,066 82	270 00	3,139 20	708 49	200 00	27,669 95

4-5 EDWARD VII., A. 1905

EXCISE,

DR. No. 4.—COLLECTION DIVISIONS

Balances due by Collectors, July 1, 1903.	Amounts received from Department to meet Expenditures.	Deductions from Salaries for				Balances due to Collectors, June 30, 1904.	Totals.	Divisions.
		Superannuation.	Insurance.	Retirement.	Guarantee.			
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	
	13,191 30	32 46		428 67	52 60		13,705 03	Vancouver
	5,778 32	128 82		19 96	20 16		5,947 26	Victoria
	2,915 20	50 00			9 00		2,974 20	District Inspector
	21,884 82	211 28		448 63	81 76		22,626 49	*British Columbia*
	438 58	6 00					444 58	Inspector of Bonded Factories
	1,017 04	6 00					1,023 04	Inspector of Breweries and Malt Houses
	477 55						477 55	Inspector of Distilleries
	130 78	1 86					132 64	Inspector of Tobacco Factories
	8,052 80						8,052 80	General Expenditures
	614 19						614 19	Legal Expenses
	42,000 00						42,000 00	Printing Tobacco Stamps
	100 00						100 00	Technical Translation
	6,600 86						6,600 86	Printing
	1,671 23						1,671 23	Stationery
	1,096 75						1,096 75	Lithographing and Engraving, &c.
	5,483 66						5,483 66	Commission to Customs Officers
	80 67						80 67	Commission on sale of Stamps for Canada Twist
	7,200 79						7,200 79	Duty-pay to Officers in charge of most important establishments
	99 96						99 96	Provisional Allowance
	500 00						500 00	Compensation to E. S. Busby, Dawson, Yukon.
343 98	449,487 56	4,923 02	103 08	5,155 17	1,254 69	49 08	461,316 58	*Grand Totals*

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

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1903–1904.

in Account with Expenditures.—*Concluded.* CR.

Balances due to Collectors, July 1, 1903.	Expenditures Authorized by the Department.						Balances due by Collectors, June 30, 1904.	Totals.
	Salaries.	Seizures Expenditure.	Special Assistance.	Rent.	Travelling Expenses.	Sundries.		
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
	10,201 05		1,629 88	651 00	524 40	698 70		13,705 03
	5,236 12		500 00		33 35	177 79		5,947 26
	2,500 00				474 20			2,974 20
	17,937 17		2,129 88	651 00	1,031 95	876 49		22,626 49
	300 00				144 08	0 50		444 58
	300 00				723 04			1,023 04
	300 00				174 55	3 00		477 55
	93 54				21 10	18 00		132 64
						8,052 80		8,052 80
						614 19		614 19
						42,000 00		42,000 00
						100 00		100 00
						6,600 86		6,600 86
						1,671 23		1,671 23
						1,096 75		1,096 75
						5,483 66		5,483 66
						80 67		80 67
						7,200 79		7,200 79
						99 96		99 96
						500 00		500 00
49 08	342,556 02	764 71	17,283 10	2,290 92	14,350 11	83,738 66	343 98	461,316 58

W. J. GERALD,
Deputy Minister.

HYDRAULIC AND OTHER RENTS.

No. 5.—Summary Statement of Lessees Accounts, 1903-1904.

(*For Details, see Appendix A.*)

Dr. Balances due July 1, 1903.	Accrued during the Year ended June 30, 1904.	Totals.		Cr. Deposited to the credit of the Receiver General.	Balances due June 30, 1904.	Totals.
$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.
1,895 84	3,360 00	5,255 84	Chaudière Falls and Ottawa River	3,347 00	1,908 84	5,255 84
125 00	26 00	151 00	St. Lawrence River	1 00	150 00	151 00
70 00	.....	70 00	Rivière du Lièvre	.....	70 00	70 00
711 00	261 00	972 00	Sundry properties	310 00	662 00	972 00
			Land Sales.			
15,573 50	.....	15,573 50	Principal accounts	.....	15,573 50	15,573 50
9,474 83	.....	9,474 83	Interest	.....	9,474 83	9,474 83
27,850 17	3,647 00	31,497 17	Totals	3,658 00	27,839 17	31,497 17

W. J. GERALD,
Deputy Minister.

Inland Revenue Department,
Ottawa, August 19, 1904.

DR. — No. 6.—MINOR PUBLIC WORKS, 1903–1904. — CR.

Balances due July 1, 1903.	Accrued during the Year ended June 30, 1904.	Totals.	Works.	Deposited to the credit of the Receiver General.	Balances due June 30, 1904.	Totals.
$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.
			Bridges.			
2,600 62		2,600 62	Dunnville		2,600 62	2,600 62
			Ferries.			
	10 00	10 00	Bristol		10 00	10 00
	15 00	15 00	Buckingham and Cumberland		15 00	15 00
	50 00	50 00	Buffalo and Point Abinot	50 00		50 00
10 00	10 00	20 00	Clair Station and Kent		20 00	20 00
	10 00	10 00	Cross Point and Campbellton	10 00		10 00
20 00		20 00	Edmundston and Maine		20 00	20 00
	50 00	50 00	Fort Erie and Buffalo	50 00		50 00
	15 00	15 00	Hawkesbury and Grenville	15 00		15 00
1,736 79		1,736 79	Hull (old lease)		1,736 79	1,736 79
	200 50	200 50	La Passe and Gower Point	200 50		200 50
	6 00	6 00	Montebello and Alfred	6 00		6 00
	30 00	30 00	Niagara and Youngstown	30 00		30 00
	1 00	1 00	Ouellette Street, Detroit	1 00		1 00
	100 00	100 00	Pembroke and Allumette Island (new lease)	100 00		100 00
1 00		1 00	Pembroke and Allumette Island (old lease)		1 00	1 00
	10 00	10 00	Queenston and Lewiston (new lease)	10 00		10 00
	125 00	125 00	Quyon		125 00	125 00
	5 00	5 00	Rockliffe and Gatineau	5 00		5 00
	1 00	1 00	Sandwich and Detroit	1 00		1 00
	100 00	100 00	Sault Ste. Marie	100 00		100 00
30 00		30 00	St. Leonard and Van Buren		30 00	30 00
			Sundries.			
8,000 00		8,000 00	Dundas and Waterloo Road		8,000 00	8,000 00
	2 00	2 00	Government telegraph lines	2 00		2 00
	25 00	25 00	Wiarton docks	25 00		25 00
	175 00	175 00	Part of building, Portland, N.B	131 25	43 75	175 00
	100 00	100 00	Building Ouellette Avenue, Windsor, Ont	100 00		100 00
12,398 41	1,040 50	13,438 91	Totals	836 75	12,602 16	13,438 91

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

W. J. GERALD,
Deputy Minister.

PREVENTIVE SERVICE, 1903-1904.

DR. No. 7.—IN ACCOUNT WITH EXPENDITURES. CR.

Amounts received from Department to meet Expenditures.	Guarantee.	Totals.		Expenditures Authorized by the Department.				Totals.
				Salaries.	Special Assistance.	Travelling Expenses.	Sundries.	
$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
205 25		205 25	Ottawa, Ont.		203 75	1 50		205 25
2,132 94	5 76	2,138 70	Toronto, Ont.	1,199 88	799 92	135 55	3 35	2,138 70
300 00		300 00	Joliette, Que.		300 00			300 00
664 90		664 90	Montreal, Que.		600 00	59 90	5 00	664 90
3,475 50		3,475 50	Quebec, Que.		3,387 89	78 96	8 65	3,475 50
504 65		504 65	St. Hyacinthe, Que.		500 00	1 65	3 00	504 65
74 06		74 06	Sherbrooke, Que.			74 06		74 06
1,787 06		1,787 06	St. John, N.B.	1,449 84		322 13	15 09	1,787 06
292 27		292 27	Halifax, N.S.		199 92	92 35		292 27
1,104 54		1,104 54	Pictou, N.S.		1,000 00	103 28	1 26	1,104 54
950 41		950 41	General				950 41	950 41
11,491 58	5 76	11,497 34	Totals	2,649 72	6,991 48	869 38	986 76	11,497 34

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

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FOOD INSPECTION, 1903-1904.

DR. — No. 8.—In Account with Expenditures. — CR.

Amounts received from Department to meet Expenditures.	Superannuation.	Totals.		Expenditures Authorized by the Department.					Totals.
				Salaries.	Special Assistance.	Rent.	Travelling Expenses.	Sundries.	
$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
10,192 37	103 96	10,296 33	Chief analyst	6,367 74	1,708 26	400 00	16 30	1,804 06	10,296 33
841 21	.....	841 21	Seaforth	500 00	.....	120 00	116 45	101 76	841 21
881 94	7 00	888 94	Montreal	350 00	.....	.....	286 50	252 44	888 94
564 02	.....	564 02	St. Hyacinthe	200 00	.....	.....	243 42	120 60	564 02
446 37	1 00	450 37	St. John, N.B.	200 00	.....	.....	174 14	76 23	450 37
451 59	.....	451 59	Halifax	300 00	.....	.....	92 98	58 61	451 59
157 37	.....	157 37	Prince Edward Island	100 00	.....	.....	21 85	35 52	157 37
348 07	.....	348 07	Calgary	200 00	.....	.....	116 00	32 07	348 07
392 78	.....	392 78	Winnipeg	200 00	.....	.....	112 65	80 13	392 78
333 55	.....	333 55	Vancouver	200 00	.....	.....	56 10	77 45	333 55
5,383 87	.....	5,383 87	General	.....	.....	.....	.....	5,383 87	5,383 87
789 44	.....	789 44	Printing	.....	.....	.....	.....	789 44	789 44
82 01	.....	82 01	Stationery	.....	.....	.....	.....	82 01	82 01
15 00	.....	15 00	Lithographing	.....	.....	.....	.....	15 00	15 00
20,879 59	111 96	20,994 55	Totals	8,617 71	1,708 26	520 00	1,236 37	8,912 19	20,994 55

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

BILL STAMPS, 1902 1903

No. 9.—Bill Stamp Distributors in account with the Inland Revenue Department.

Dr. Balances July 1, 1903.		Totals.		Cr. Balances June 30, 1904.		Totals.
Stamps on hand.	Cash on hand.			Stamps on hand.	Cash on hand.	
$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.
1,372 77		1,372 77	Post Office Department	1,372 77		1,372 77
	11 54	11 54	Belleville, ex-Collector E. R. Benjamin		11 54	11 54
	33 50	33 50	Three Rivers, ex-Collector B. Lassalle		33 50	33 50
160 00		160 00	McLeod, Colonel J. F. Fort McLeod	160 00		160 00
1,532 77	45 04	1,577 81	Totals	1,532 77	45 04	1,577 81

W. J. GERALD,
Deputy Minister.

Inland Revenue Department,
Ottawa, August 19, 1904.

LAW STAMPS.

No. 10.—Law Stamps in account with the Inland Revenue Department.

Dr. Cr.

Stamps on hand July 1, 1903.	Stamps received from Department.	Totals.		Commission of 5 per cent allowed by Department on stamps sold.	Deposited to the credit of the Receiver General.	Stamps on hand June 30, 1904.	Totals.
$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.
.....	1,450 00	1,450 00	... Cameron, R., Registrar, Supreme Court.....	72 50	1,377 50	.....	1,450 00
.....	3,599 80	3,599 80	... Andette, L. A., Registrar, Exchequer Court.....	179 99	3,419 81	.....	3,599 80
13,154 00	21,500 00	34,654 00	... Lithgow, J. T., Dawson, Yukon Territorial Court	.....	10,266 25	24,387 75	31,654 00
2,643 00	3,500 00	6,143 00	.... " " Mining Court.....	.....	1,942 75	4,200 25	6,143 00
15,797 00	30,049 80	45,846 80	.... Totals.....	252 49	17,006 31	28,588 00	45,846 80

INLAND REVENUE DEPARTMENT,
Ottawa, August 19, 1904.

W. J. GERALD,
Deputy Minister.

DR. No. 11.—SUNDRY MINOR REVENUES, 1903-1904. CR.

Accrued during the Year ended June 30, 1904.	Totals.	——	Deposited to the credit of the Receiver General.	Totals.
$ cts.	$ cts.		$ cts.	$ cts.
378 00	378 00	Fertilizers Inspection Fees	378 00	378 00
177 00	177 00	Adulteration of Food Fees	177 00	177 00
13 63	13 63	Casual Revenue	13 63	13 63
568 63	568 63	Totals	568 63	568 63

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

DR. No. 12.—MINOR EXPENDITURES, 1903-1904. CR.

Amounts received from Department to meet Expenditures.	Totals.		Contingencies.	Totals.
$ cts.	$ cts.		$ cts.	$ cts.
33 41	33 41	Minor expenditures	33 41	33 41

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT.
OTTAWA, August 19, 1904.

No. 13.—STATEMENT showing the quantities of the several articles subject to Excise and the Duty

ARTICLES SUBJECT TO EXCISE DUTY.	1902. QUANTITIES. Ex-Manufactory.	Ex-Warehouse.	Totals.	Duty.
	Gallons.	Gallons.	Gallons.	$ cts.
Spirits	2,488	2,933,183	2,935,671	5,561,785 41
	Imported.	*187,759	187,759	56,327 57
Totals	2,488	3,120,942	3,123,430	5,618,112 98
Malt liquor, the duty being paid on malt	27,623,767		27,623,767	369 70
	Lbs.	Lbs.	Lbs.	
Malt		71,440,519	71,440,519	1,071,608 74
Cigars—	No.	No.	No.	
Foreign	79,815,531	62,268,640	142,084,171	852,508 68
Canadian	2,961,230	750,920	3,712,150	11,136 45
Combination	2,927,345	3,056,850	5,984,195	17,952 61
Totals	85,704,106	66,076,410	151,780,516	881,597 74
Cigarettes—				
Foreign	130,963,584	1,315,450	132,279,034	397,099 86
Canadian		975,000	975,000	1,462 50
Combination	982,000		982,000	1,473 00
Totals	131,945,584	2,290,450	134,236,034	400,035 36
	Lbs.	Lbs.	Lbs.	
Tobacco from Foreign leaf	666,696½	6,442,612½	7,109,309	1,777,327 41
" Canadian leaf	2,731,051	200,992	2,932,043	146,640 32
" Combination leaf	713,156	569,650	1,282,806	64,102 24
Snuff	173,188		173,188	31,635 79
Canadian twist		72,286½	72,286½	3,614 33
Totals	4,284,091½	7,285,541	11,569,632½	2,423,355 36
Raw leaf tobacco, foreign		10,704,961¾	10,704,961¾	1,137,279 05
Total duties on tobacco and cigarettes				3,560,634 41
Vinegar				42,881 40
Acetic acid				8,762 31
Licenses, spirits				2,500 00
" malt liquor				6,600 00
" malt				6,200 00
" cigars				15,762 50
" tobacco				2,944 00
" bonded manufactures				2,425 00
" acetic acid				100 00
				11,220,498 78

*Spirits imported for use in the manufacture of crude fulminate, on which duty at the rate of 30 cents

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

SESSIONAL PAPER No. 12

Duty taken for consumption, during the years ended June 30, 1902, 1903 and 1904, accrued thereon.

1903.				1904.			
Quantities.			Duty.	Quantities.			Duty.
Ex-Manufactory.	Ex-Warehouse.	Totals.		Ex-Manufactory.	Ex-Warehouse.	Totals.	
Gallons.	Gallons.	Gallons.	$ cts.	Gallons.	Gallons.	Gallons.	$ cts.
1,019	2,979,268	2,980,287	6,096,782 97	6,458	3,481,287	3,487,745	6,601,801 10
Imported.	228,480	228,480	68,543 92	Imported.	225,326	225,326	67,597 85
1,019	3,207,748	3,208,767	6,160,326 89	6,458	3,706,613	3,713,071	6,669,398 95
25,755,154	....	....	2,910 20	27,335,985	....	....	2,489 00
Lbs.	Lbs.	Lbs.		Lbs.	Lbs.	Lbs.	
....	67,608,157	67,608,157	1,014,123 00	....	75,430,347	75,430,347	1,131,455 78
No.	No.	No.		No.	No.	No.	
83,121,844	76,003,930	159,125,774	954,766 50	87,942,746	82,991,404	170,934,150	1,025,625 27
2,185,260	696,100	2,881,360	8,644 08	1,609,040	591,200	2,200,240	6,600 72
2,740,073	3,543,215	6,283,288	18,848 87	3,588,387	3,762,425	7,350,812	22,052 48
88,047,177	80,243,245	168,290,422	982,260 45	93,140,173	87,345,029	180,485,202	1,054,278 47
175,489,240	607,000	176,096,240	530,836 22	204,350,900	1,241,469	205,592,369	620,581 90
....	....	....	....	....	....	....	....
122,000	217,000	339,000	508 50	4,764,650	945,091	5,709,741	8,564 62
175,611,240	824,000	176,435,240	531,344 72	209,115,550	2,186,491	211,302,041	629,146 52
Lbs.	Lbs.	Lbs.		Lbs.	Lbs.	Lbs.	
676,495½	6,685,079½	7,361,575	1,840,393 95	785,548	7,036,102	7,821,650	1,955,412 87
3,048,926	102,798⅝	3,151,724⅝	157,586 17	2,927,747	66,104	2,993,851	149,692 64
1,011,933½	758,833½	1,770,767	88,538 48	920,698	612,497	1,533,195	76,660 00
170,622	....	170,622	31,196 85	178,057	....	178,057	32,702 23
....	53,256	53,256	2,662 80	....	47,771	47,771	2,388 58
4,907,977	7,599,967½	12,507,944½	2,651,722 97	4,812,050	7,762,474	12,574,524	2,846,002 84
....	11,615,963¾	11,615,963¾	1,249,569 17	....	12,139,700	12,139,700	1,278,455 09
....	....	....	3,901,292 14	....	....	....	4,124,457 93
....	....	....	43,023 54	....	....	....	42,743 28
....	....	....	6,028 19	....	....	....	2,600 97
....	....	....	2,500 00	....	....	....	2,750 00
....	....	....	6,575 60	....	....	....	6,550 00
....	....	....	6,500 00	....	....	....	6,100 00
....	....	....	16,235 00	....	....	....	16,545 00
....	....	....	3,324 50	....	....	....	3,221 00
....	....	....	2,000 00	....	....	....	2,600 00
....	....	....	100 00	....	....	....	100 00
			12,147,199 21				13,065,290 38

per gallon was collected and afterwards refunded on the exportation of the fulminate.

W. J. GERALD,
Deputy Minister.

No. 14.—Amounts deposited monthly to the credit of the Honourable the Receiver General on account of Inland Revenues during the Fiscal Year ended June 30, 1903-4.

	Ontario.	Quebec.	New Brunswick.	Nova Scotia.	Prince Edward Island.	Manitoba and North west Territories.	British Columbia.	Yukon.	Totals.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
July:—									
Excise	355,037 68	452,232 08	21,373 98	16,835 98	2,851 25	73,602 71	35,185 33	831 26	957,950 27
" Seizures	50 00								50 00
Hydraulic Rents		100 00							100 00
Weights and Measures	651 90	686 78							1,338 68
Gas Inspection	37 50								37 50
Electric Light Inspection	299 50						13 75		313 25
Methylated Spirits	3,466 01	2,230 12	18 76	244 22					5,959 11
Other Revenues	2,092 81	355 00	145 00	215 00	8 00	215 00	290 00	368 50	3,689 31
Totals	361,635 40	455,603 98	21,567 74	17,295 20	2,859 25	73,817 71	35,489 08	1,199 76	969,468 12
August:—									
Excise	421,623 15	472,914 95	24,354 50	17,901 96	4,861 01	80,641 12	40,866 04	1,657 28	1,064,820 01
" Seizures	125 00		250 00	200 00					575 00
Hydraulic Rents			5 00						5 00
Weights and Measures	2,092 85	2,505 19	110 57	112 32	61 69	955 20	62 35		6,230 17
Gas Inspection	1,322 50	425 75	17 50	52 75		49 00			1,867 50
Electric Light Inspection	541 00	384 75	77 75	62 00	55 75	91 25	108 25		1,323 75
Methylated Spirits	3,491 58	1,273 82	155 63	102 92			62 18		5,086 13
Other Revenues	418 75	225 00	15 00	100 00	35 00			1,641 50	2,465 25
Totals	429,647 83	477,729 46	24,985 95	18,861 95	5,013 45	81,736 57	41,098 82	3,298 78	1,082,372 81
September:—									
Excise	451,139 01	488,491 09	27,892 27	20,937 52	4,593 30	87,977 36	43,730 26	3,433 43	1,128,194 24
" Seizures	75 00		100 00	100 00					575 00
Minor Public Works	25 00		43 75						68 75
Weights and Measures	2,855 19	2,503 23	148 97	269 14	45 51	798 55	210 85		6,861 47
" " Seizures	5 00								5 00
Gas Inspection	1,105 75	631 00	63 00	23 00		74 50	66 25		1,963 50
Electric Light Inspection	1,057 75	243 50	143 25	112 00	39 25	71 00	155 75		1,822 50
Methylated Spirits	3,241 92	1,426 04	123 94			86 58	130 26		5,008 74
Other Revenues	923 25	40 00		3 00				1,593 00	2,559 25
Totals	460,427 87	493,334 86	28,815 18	21,444 66	4,678 09	89,007 99	44,323 37	5,026 43	1,147,058 45

OCTOBER :									
Excise	476,274 42	511,687 80	26,251 47	23,992 87	5,170 05	89,199 23	43,184 75	1,171 67	1,210,238 26
" Seizures	50 00								50 00
Weights and Measures	7,483 15	2,016 31	138 91	121 41	73 75	910 72	61 10		10,805 98
Gas Inspection	1,208 25	763 75	63 00	38 00	30 25	28 50	37 50		2,169 25
Electric Light Inspection	759 00	287 50	106 50	86 00	24 75	155 50	168 25		1,587 50
Methylated Spirits	3,645 70	2,516 18		122 88			44 79		6,329 55
Other Revenues	229 25						1 00	857 75	1,091 00
Totals	489,651 07	550,271 54	26,562 91	24,361 16	5,598 80	90,293 95	43,500 69	2,032 12	1,232,271 54
NOVEMBER :									
Excise	166,650 93	508,901 68	29,214 15	21,038 12	4,339 30	102,111 75	38,885 99	2,865 88	1,174,041 40
" Seizures	130 00		100 00	343 00					573 00
Hydraulic Rents	301 00	1 00							302 00
Minor Public Works	1 00								1 00
Weights and Measures	2,634 10	1,060 50	245 95	285 20	70 36	377 29	120 60		1,794 00
Gas Inspection	1,197 00	846 50	39 75	38 00	9 25	119 75	10 25		2,260 50
Electric Light Inspection	747 50	534 50	108 25	97 25	12 00	127 50	455 25		2,082 25
Methylated Spirits	3,808 84	1,710 12		104 50		258 99			5,882 75
Other Revenues	309 84		1 00	25 00			5 00	1,321 25	1,665 09
Totals	475,780 21	513,024 60	29,709 40	21,931 37	4,430 91	103,028 28	39,507 09	4,190 13	1,191,601 99
DECEMBER									
Excise	171,910 54	598,884 52	25,256 81	21,956 42	4,104 80	91,952 87	48,392 26	734 81	1,266,193 03
" Seizures			758 00			25 00			783 00
Hydraulic Rents	301 00	1 00					13 00		315 00
Minor Public Works	26 00		43 75				1 00		70 75
Weights and Measures	2,281 00	821 22	366 59	180 47	3 60	658 57	52 15		4,366 60
Gas Inspection	1,075 50	593 50	22 00	29 50		58 75	26 75		1,806 00
Electric Light Inspection	670 50	223 50	131 75	72 75	11 75	284 75	221 75		1,622 75
Methylated Spirits	3,272 51	2,230 89	46 51				18 76		5,598 70
Other Revenues	572 00	15 00		3 00				980 25	1,600 25
Totals	180,112 08	602,799 63	26,628 11	22,242 14	4,123 15	95,979 94	48,755 67	1,715 06	1,282,656 08
JANUARY :									
Excise	111,531 82	122,486 07	23,026 65	20,185 12	3,451 90	76,852 11	31,255 15	508 53	992,297 98
" Seizures	50 00								50 00
Hydraulic Rents	50 00								50 00
Minor Public Works	25 00								25 00
Weights and Measures	5,470 25	497 35	101 81	36 38	11 00	323 00	75 25		6,515 04
Gas Inspection	1,567 00	592 50	75 25	78 00	10 50	46 25	107 25		2,476 75
Electric Light Inspection	179 00	243 25	148 50	37 00	2 75	193 50	183 25		1,287 25
Methylated Spirits	3,116 60	1,393 70	15 72						1,556 02
Other Revenues	684 75	26 00	3 00	25 00		5 00		367 00	1,110 75
Totals	122,974 42	125,238 87	23,400 93	20,361 50	3,476 15	77,420 19	31,621 29	875 53	1,008,368 79

No. 11. Amounts deposited monthly to the credit of the Honourable the Receiver General, &c.—*Concluded.*

	Ontario.	Quebec.	New Brunswick.	Nova Scotia.	Prince Edward Island.	Manitoba and North-west Territories.	British Columbia.	Yukon.	Totals.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
FEBRUARY:									
Excise	401,794 59	443,754 70	20,398 82	17,181 87	3,886 30	67,018 61	36,425 29	926 11	991,689 29
" Seizures				50 00					50 00
Hydraulic Rents	1,051 00	1 00		16 00					1,068 00
Minor Public Works	26 00		43 75						69 75
Weights and Measures	1,265 42	643 60	109 80	11 05	9 60	484 65	68 15		2,625 27
" " Seizures		25 00							25 00
Gas Inspection	1,057 75	536 50	26 00	15 25	15 00	55 00			1,705 50
Electric Light Inspection	411 50	119 25	122 50	25 25	4 00	202 50	107 00		1,292 00
Methylated Spirits	3,139 41	2,262 28	47 70	13 07		85 22	600 94		6,178 65
Other Revenues	520 44	5 00	17 00	21 00				513 25	1,076 69
Totals	409,266 14	447,647 33	20,765 57	17,699 49	3,914 90	67,845 98	37,201 38	1,439 36	1,005,780 15
MARCH:									
Excise	440,685 54	468,720 05	22,260 14	19,287 35	4,687 20	79,505 70	46,562 18	1,782 03	1,083,490 19
Hydraulic Rents	1,251 00						1 00		1,252 00
Minor Public Works	50 00								50 00
Weights and Measures	2,233 35	593 32	92 05	25 05	8 25	119 00	84 80		3,155 82
Gas Inspection	691 00	503 50	39 75	28 00	16 75	96 00	127 25		1,502 25
Electric Light Inspection	371 75	468 25	116 25	38 00	2 75	34 00	123 25		1,154 25
Methylated Spirits	3,138 20	2,043 11	43 47	41 89			44 00		5,310 97
Other Revenues	550 00	5 00	13 00	12 00			27 00	626 75	1,233 75
Totals	448,970 84	472,333 53	22,564 66	19,432 29	4,714 95	79,754 70	46,969 48	2,408 78	1,097,119 23
APRIL:									
Excise	410,288 50	472,706 68	22,296 63	18,894 71	5,452 85	79,581 35	38,720 00	1,651 81	1,049,592 53
" Seizures	150 00						200 00		350 00
Minor Public Works		6 00	10 00						16 00
Weights and Measures	2,829 36	1,082 88	150 15	82 87	19 00	201 10	56 80		4,425 16
Gas Inspection	1,005 25	1,027 25	75 75	62 50	9 00	95 25	38 00		2,313 00
Electric Light Inspection	738 00	551 00	225 00	62 50	0 50	105 25	123 25		1,805 50
Methylated Spirits	3,164 41	2,586 06	191 18	203 46			164 32		6,309 43
Other Revenues	339 25		2 00	6 00				719 75	1,067 00
Totals	418,514 77	477,959 87	22,950 71	19,312 04	5,481 35	79,985 95	39,302 37	2,371 56	1,065,878 62

MAY:									
Excise	455,062 18	470,749 27	22,062 91	14,892 87	5,434 85	84,572 57	14,524 01	1,224 15	1,098,492 81
" Seizures	10 00	307 59					950 00		1,267 59
Hydraulic Rents	5 00	2 00							7 00
Minor Public Works	380 50	5 00							385 50
Weights and Measures	1,997 10	1,294 68	110 31	176 31	18 90	538 26	66 90		4,202 46
Gas Inspection	1,689 00	825 25	11 50	32 25	11 25	73 25	37 25		2,712 75
Electric Light Inspection	336 75	439 75	166 75	38 50		139 50	474 75		1,596 00
Methylated Spirits	2,974 28	2,319 67	42 95	102 52					5,439 42
Other Revenues	482 75							454 25	937 00
Totals	462,937 56	475,943 21	22,427 42	15,242 45	5,465 00	85,323 58	16,052 91	1,678 40	1,115,040 53
JUNE:									
Excise	387,338 04	508,009 32	28,146 08	20,790 76	5,625 90	97,947 82	53,274 71	4,703 38	1,105,836 01
" Seizures		10 00	30 00				50 00		90 00
Hydraulic Rents	401 00	1 00		6 00			151 00		559 00
Minor Public Works	150 00								150 00
Weights and Measures	5,294 07	3,673 85	593 56	601 97	56 94	653 35	430 80		11,004 54
Gas Inspection	3,907 50	1,750 25	90 50	99 25	28 50	174 00	90 50		6,140 50
" Seizures	5 00								5 00
Electric Light Inspection	1,199 50	602 25	384 00	170 50	3 75	192 00	384 75		2,936 75
Methylated Spirits	3,965 41	2,519 75		151 03					6,636 22
Other Revenues	536 85	70 00	9 00	25 00		36 00		2,837 75	3,514 60
Totals	402,797 40	516,636 42	29,253 14	21,844 51	5,715 09	99,003 17	54,081 76	7,541 13	1,136,872 62
Grand Total	5,262,714 59	5,908,493 30	299,632 02	240,028 76	55,771 09	1,023,198 01	510,903 82	33,777 34	13,334,518 93

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1901.

W. J. GERALD,
Deputy Minister.

4-5 EDWARD VII., A. 1905

EXCISE

No. 15.—Comparative Monthly

		July.	August.	September.	October.	November.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Spirits	1902-1903	461,778 78	463,136 68	522,155 23	579,236 64	518,642 76
	1903-1904	523,356 39	515,459 87	606,135 48	617,207 93	618,157 58
	Increase, 1903-1904	61,577 61	52,323 19	83,980 25	37,971 29	99,514 82
	Decrease, 1903-1904					
Malt Liquors	1902-1903	6,275 00	315 00	100 00	150 00	142 30
	1903-1904	6,313 50	383 60	505 10	100 00	306 00
	Increase, 1903-1904	38 50	68 60	405 10		157 70
	Decrease, 1903-1904				50 00	
Malt	1902-1903	81,817 94	73,860 19	86,782 40	88,049 84	81,829 68
	1903-1904	93,761 39	85,982 01	82,273 48	91,166 78	90,591 62
	Increase, 1903-1904	11,943 45	12,121 82		3,116 94	8,761 94
	Decrease, 1903-1904			4,508 92		
Tobacco	1902-1903	340,176 36	319,059 13	353,722 89	353,400 81	325,417 97
	1903-1904	355,764 95	337,301 42	360,130 71	387,419 48	360,453 19
	Increase, 1903-1904	15,588 59	18,242 29	6,407 82	34,018 67	35,035 22
	Decrease, 1903-1904					
Cigars	1902-1903	98,273 10	82,877 23	82,990 17	89,016 90	86,841 75
	1903-1904	106,452 26	92,261 02	93,731 33	93,320 28	89,952 75
	Increase, 1903-1904	8,179 16	9,383 79	10,741 16	4,303 38	3,111 00
	Decrease, 1903-1904					
Acetic Acid	1902-1903	1,200 49	269 61	1,429 62	182 12	
	1903-1904	337 32	236 86	625 56	95 07	
	Increase, 1903-1904					
	Decrease, 1903-1904	863 17	32 75	804 06	87 05	
Manufactures in bond	1902-1903	3,894 46	4,993 34	6,280 54	6,734 03	3,490 12
	1903-1904	4,556 69	4,235 08	7,112 29	6,718 58	3,724 53
	Increase, 1903-1904	662 23		831 75		234 41
	Decrease, 1903-1904		758 26		15 45	
Seizures	1902-1903	505 00	265 30	343 70	10 00	60 15
	1903-1904	225 00	800 00	175 00	100 00	523 00
	Increase, 1903-1904		534 70		90 00	462 85
	Decrease, 1903-1904	280 00		168 70		
Other receipts	1902-1903	13,995 91	1,101 43	1,610 97	3,472 57	2,772 76
	1903-1904	8,834 93	9,697 84	2,061 21	3,125 02	2,744 80
	Increase, 1903-1904		8,596 41	450 24		
	Decrease, 1903-1904	5,160 98			347 55	27 96
Total Revenue	1902-1903	1,007,917 04	945,877 91	1,055,415 52	1,120,252 91	1,019,197 49
"	1903-1904	1,099,602 43	1,046,357 70	1,152,750 16	1,199,253 14	1,166,447 47
Total Increase,	1903-1904	91,685 39	100,479 79	97,334 64	79,000 23	147,249 98
" Decrease,	1903-1904					

Inland Revenue Department,
Ottawa, August 19, 1904.

SESSIONAL PAPER No. 12

REVENUE.

Statement, 1902–1903 and 1903–1904.

December.	January.	February.	March.	April.	May.	June.	Totals.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
753,694 53	447,226 31	458,788 66	462,967 56	503,265 69	511,206 55	480,727 50	1,162,826 89
815,679 44	479,794 29	508,406 41	538,361 78	496,887 26	490,126 13	462,576 39	6,672,118 95
61,984 91	32,567 98	49,617 75	75,394 22	.....	.....	.....	509,322 06
.....	.....	.....	.....	6,378 43	21,080 42	18,151 11	.....
50 00	145 60	75 00	492 00	495 00	708 60	537 30	9,485 20
343 10	75 50	...	50 00	598 20	370 00	..	9,039 00
293 10	.....	.....	.....	103 20	.....	.....	.....
.....	69 50	75 00	442 00	.....	388 60	537 30	446 20
75,523 98	76,641 59	77,875 21	89,301 42	96,882 14	95,282 77	96,775 84	1,020,623 00
86,279 93	79,200 21	84,630 33	96,605 90	99,449 01	159,850 00	87,765 03	1,187,555 78
10,755 95	2,558 62	6,755 12	7,304 48	2,566 87	64,567 32	.....	116,932 78
.....	.....	.....	.....	.....	.....	9,010 81	.....
270,819 71	293,409 22	317,645 82	325,856 72	332,846 88	321,711 09	350,550 04	3,904,616 64
311,557 15	309,461 51	323,613 27	362,770 27	346,891 16	338,388 58	333,927 24	4,127,678 93
40,737 44	16,052 29	5,967 45	36,913 55	14,044 28	16,677 49	.....	223,062 29
.....	.....	.....	.....	.....	.....	16,622 80	.....
77,125 94	65,268 25	67,594 31	75,923 19	87,577 62	88,986 07	96,020 92	998,495 45
86,840 43	68,408 63	72,236 89	83,498 56	88,769 67	95,294 30	100,057 38	1,070,823 47
9,714 49	3,140 38	4,642 58	7,575 34	1,192 05	6,308 23	4,036 46	72,328 02
.....	.....	.....	.....	.....	.....	.....	.....
43 76	.....	333 38	.....	.....	1,698 15	971 36	6,128 49
613 10	.....	57 67	188 82	288 59	38 84	219 14	2,700 97
569 34	.....	.....	188 82	288 59	.....	.....	.....
.....	.....	275 71	.....	.....	1,659 31	752 22	3,427 52
2,379 41	1,195 10	2,421 36	2,372 92	3,096 49	4,209 93	3,955 84	45,023 54
1,563 85	1,382 99	1,015 76	2,616 17	3,122 63	4,850 95	4,444 66	45,348 28
.....	187 89	.....	243 25	26 14	640 12	488 82	319 74
815 56	.....	1,405 60	.....	.....	.....	.....	.....
26 66	27 06	100 00	5 00	426 76	342 95	717 35	2,829 98
783 00	50 00	50 00	.....	1,300 00	367 59	40 00	4,418 59
756 34	22 94	.....	.....	873 24	24 64	.....	1,583 66
.....	.....	50 00	5 00	.....	...	677 35	.....
3,560 20	2,020 61	2,124 03	2,680 46	2,474 84	1,544 63	2,735 27	40,093 68
2,502 63	8,911 68	4,447 10	4,824 67	3,117 36	3,404 75	3,216 60	56,888 59
.....	6,891 07	2,323 07	2,144 21	642 52	1,860 12	481 33	16,794 91
1,057 57	.....	.....	.....	.....	.....	.....	.....
1,183,224 19	885,933 14	926,957 77	959,599 27	1,027,065 42	1,025,690 74	1,032,991 42	12,190,122 82
1,306,162 63	947,284 81	994,457 43	1,088,916 14	1,040,423 88	1,092,690 33	992,246 44	13,126,592 56
122,938 44	61,351 67	67,499 66	129,316 87	13,358 46	66,999 59	.....	936,469 74
.....	.....	.....	.....	.....	.....	40,744 98	.....

W. J. GERALD,
Deputy Minister.

No. 16.—Refunds of Revenue during the fiscal year ended June 30, 1904.

EXCISE.

Articles.	To whom paid.	Date.	Divisions.	Under what Authority Refunded.	Amounts.	Totals.
		1903.			$ cts.	$ cts.
Spirits	Swift, E. G.	July 29.	Windsor	Refunded under Revised Statutes, cap. 34, sec. 238	330 16	
	"	Aug. 4.	"	" " 34 " 238	67 47	
	"	" 8.	"	" " 34 " 238	115 15	
	"	" 14.	"	" " 34 " 238	137 18	
	"	Sept. 11.	"	" " 34 " 238	326 46	
	"	" 15.	"	" " 34 " 238	1,260 35	
	"	" 21.	"	" " 34 " 238	197 66	
	"	" 28.	"	" " 34 " 238	195 32	
	"	Oct. 7.	"	" " 34 " 238	19 87	
	Heney, J. J.	" 12.	Prescott	" " 34 " 238	13,416 43	
	Swift, E. G.	" 19.	Windsor	" " 34 " 238	0 08	
	"	" 19.	"	" " 34 " 238	899 42	
	"	" 23.	"	" " 34 " 238	357 96	
	King, H. L.	" 23.	"	" " 34 " 238	742 81	
	Eastern Townships Bank, for G. M. Howard	" 23.	Sherbrooke	" " 34 " 238	3,746 21	
	Swift, E. G.	Nov. 4	Windsor	" " 34 " 238	2 43	
	"	" 11.	"	" " 34 " 238	1,696 89	
	"	" 23.	"	" " 34 " 238	155 51	
	"	" 28.	"	" " 34 " 238	158 65	
	"	Dec. 11.	"	" " 34 " 233	120 76	
	"	" 15.	"	" " 34 " 238	249 18	
	"	" 21.	"	" " 34 " 238	70 60	
	"	" 28.	"	" " 34 " 238	702 73	
	"	" 29.	"	" " 34 " 238	107 77	
		1904.				
	"	Jan. 7.	"	" " 34 " 238	52 44	
	"	" 21.	"	" " 34 " 238	29 53	
	Hamilton, J. S. & Co.	" 27.	Brantford	" " 34 " 238	135 35	
	Swift, E. G.	Feb. 3.	Windsor	" " 34 " 238	287 36	
	"	" 9.	"	" " 34 " 238	206 99	
	"	" 11.	"	" " 34 " 238	412 39	
	"	" 13.	"	" " 34 " 238	49 93	
	"	" 19.	"	" " 34 " 238	11 36	
	"	" 23.	"	" " 34 " 238	136 48	
	"	Mar. 10.	"	" " 34 " 238	73 51	

	Hiram Walker & Sons, Ltd.	"	14	"	"	"	34 " 238	6 19	
	Swift, E. G.	"	23	"	"	"	34 " 238	283 71	
	"	"	24	"	"	"	34 " 238	500 14	
	"	"	29	"	"	"	34 " 238	159 35	
	"	April	6	"	"	"	34 " 238	124 07	
	"	"	13	"	"	"	34 " 238	12 27	
	"	"	20	"	"	"	34 " 238	665 01	
	"	"	26	"	"	"	34 " 238	522 69	
	"	"	27	"	"	"	34 " 238	173 86	
	Howard, G. M	"	30	Sherbrooke	"	"	34 " 238	3,918 27	
	Swift, E. G.	May	7	Windsor	"	"	34 " 238	93 48	
	Heney, J. J	"	11	Prescott	"	"	34 " 238	14,188 39	
	Swift, E. G.	"	17	Windsor	"	"	34 " 238	267 51	
	Heney, J. J	"	20	Prescott	"	"	34 " 238	14,434 71	
	King, H. L.	"	30	Windsor	"	"	34 " 238	769 41	
	Swift, E. G.	"	30	"	"	"	34 " 238	227 60	
	Austin, A. S	"	31	"	"	"	34 " 238	1,595 01	
	Swift, E. G.	"	31	"	"	"	34 " 238	211 61	
	Heney, J. J	June	6	Prescott	"	"	34 " 238	14,438 57	
	Swift, E. G.	"	11	Windsor	"	"	34 " 238	2 24	
	"	"	17	"	"	"	34 " 238	7 96	
	"	"	28	"	"	"	34 " 238	218 57	
	"	July	6	"	"	"	34 " 238	365 21	
	"	"	18	"	"	"	34 " 238	335 62	
	"	"	25	"	"	"	34 " 238	58 21	
	"	"	29	"	"	"	34 " 238	291 67	
		1903.							80,703 75
Malt	Bauer, A	Aug.	6	Guelph	"	"	29 " 78	1,174 34	
	Sleeman B. & M. Co., The	"	6	"	"	"	29 " 78	795 26	
	Huether, C. N	"	6	"	"	"	29 " 78	506 68	
	Bernhardt, V. P.	"	6	"	"	"	29 " 78	176 93	
	Rau, Mary	"	6	"	"	"	29 " 78	473 25	
	Seagram, J. E.	"	6	"	"	"	29 " 78	83 25	
	Todd, M. N.	"	6	"	"	"	29 " 78	32 40	
	Lutz, W. H.	"	6	"	"	"	29 " 78	1 73	
	Calcutt, Henry	"	6	Peterborough	"	"	29 " 78	261 51	
	McCarthy, D. J	"	6	Prescott	"	"	29 " 78	165 63	
	Bowie, Robert	"	6	Brockville	"	"	29 " 78	247 35	
	Wiser, J. P.	"	6	Prescott	"	"	29 " 78	195 27	
	Taylor, R. J	"	6	St. Catharines	"	"	29 " 78	583 45	
	White, T. W	"	6	"	"	"	29 " 78	211 20	
	Dawes, A. J.	"	6	Montreal	"	"	29 " 78	2,732 44	
	Dow & Co., W.	"	6	"	"	"	29 " 78	2,696 11	
	Clarke, E. L	"	6	"	"	"	29 " 78	797 10	
	Reinhardt, L. jr	"	6	"	"	"	29 " 78	675 00	
	Reinhardt, C. S	"	6	"	"	"	29 " 78	246 90	
	Winfindale, A. H	"	6	"	"	"	29 " 78	67 50	
	Molson, J. T.	"	6	"	"	"	29 " 78	30 00	
	Clouthier, D.	"	6	"	"	"	29 " 78	20 88	
	Boswell & Bros.	"	6	Quebec	"	"	29 " 78	1,145 00	

No. 16. —Refunds of Revenue— *Continued.*

EXCISE— *Continued.*

Articles.	To whom paid.	Date.	Divisions.	Under what Authority Refunded.	Amounts.	Totals.
		1903.			$ cts.	$ cts.
Malt—*Con*	Beauport Brewing Co., The	Aug. 6	Quebec	Refunded under Revised Statutes, cap. 29, sec. 78	480 00	
	Ready, Jas	" 6	St. John	" " 29 " 78	715 62	
	Jones, Simeon, Ltd	" 6	"	" " 29 " 78	312 00	
	Cross, A. E	" 6	Calgary	" " 29 " 78	671 10	
	Oehsner Robt	" 6	"	" " 29 " 78	93 60	
	Union Brewing Co	" 6	"	" " 29 " 78	189 00	
	Tate, Robert	" 6	Victoria	" " 29 " 78	9 00	
	Allan & Hose	" 6	Vancouver	" " 29 " 78	6 00	
	Enterprise Brewing Co	" 6	"	" " 29 " 78	12 35	
	Amyot & Garvin	" 11	Quebec	" " 29 " 78	750 00	
	Imperial Brewing Co	" 13	Vancouver	" " 29 " 78	3 00	
	Nelson, Nels	" 18	"	" " 29 " 78	51 00	
	Holliday, T	" 19	Guelph	" " 29 " 78	569 51	
	Proteau & Carignan	" 19	Quebec	" " 29 " 78	381 30	
	Henderson, Hugh	" 21	Vancouver	" " 29 " 78	11 17	
	Lion Brewing Co	" 21	"	" " 29 " 78	16 50	
	Todd, Martin N	Sept. 1	Peterborough	" " 29 " 78	361 81	
	Sleeman B. & M. Co., The	" 2	Guelph	" " 29 " 78	820 70	
	Nelson, Nels	" 15	Vancouver	" " 34 " 238	95 55	
	Vancouver Breweries, Ltd.,	" 15	"	" " 34 " 238	26 73	
	Labatt, John	" 21	London	" " 34 " 238	25 58	
	Victoria Phœnix B. Co	Oct. 9	Victoria	" " 34 " 238	332 01	
	Oland, G. W. C	" 9	"	" " 34 " 238	2 73	
	Wickwire, W. N	" 9	Halifax	" " 34 " 238	2,131 08	
	Vancouver Breweries, Ltd.,	" 19	Vancouver	" " 34 " 238	26 73	
	Nelson, Nels	" 19	"	" " 34 " 238	123 75	
	McCarthy D. J	Dec. 18	Prescott	" " 29 " 78	50 25	
	Walkerville, Brg. Co., Ltd.	" 18	Windsor	" " 29 " 78	61 37	
		1904.				
	Wickwire, W. N	Jan. 1	Halifax	" " 34 " 238	1,992 72	
	Victoria Phœnix B. Co	" 4	Victoria	" " 34 " 238	482 58	
	Vancouver Breweries, Ltd.,	" 19	Vancouver	" " 34 " 238	59 76	
	" "	" 19	"	" " 34 " 238	66 00	
	" "	" 19	"	" " 34 " 238	92 55	
	Nelson, Nels	" 20	"	" " 34 " 238	21 68	
	Grant's Spring Brewery Co.	" 27	Hamilton	" " 29 " 78	212 19	

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Victoria Phœnix B. Co	Feb.	3.	Victoria									139 21
Labatt, John	"	11.	London									29 82
Nelson, Nels	"	18.	Vancouver									19 50
Lake, C	March	22.	Brantford									16 24
Walkerville B. Co., Ltd	April	15.	Windsor									54 54
Huether, C. N	"	15.	Guelph									336 35
Oland, G. W. C	"	18.	Halifax									4 26
Wiekwire, W. N	"	18.	"									1,979 89
Victoria Phœnix B. Co	"	18.	Victoria									405 81
Wiekwire, W. N	"	21.	Halifax									647 42
Nelson, Nels	May	17.	New Westminster									25 50
Carling, T. H	"	20.	London									223 33
Walkerville B. Co., Ltd	June	6.	Windsor									67 50
Victoria Phœnix B. Co	July	6.	Victoria									419 55
Wiekwire, W. N	"	6.	Halifax									1,378 30
McCarthy, D. J	"	6.	Prescott									36 46
Vancouver Breweries, Ltd	"	7.	Vancouver									90 00
Watson, John	"	12.	Stratford									37 79
Cody, Henry	"	13.	Belleville									42 49
Roy, James A	"	13.	"									217 11
Clarke, L. H	"	13.	Kingston									1,713 26
Fisher, John	"	13.	"									334 57
Stevenson, Thomas	"	13.	"									126 82
O'Dwyer, Patrick	"	13.	London									249 00
Labatt, John	"	13.	"									1,456 13
Carling, T. H	"	13.	"									1,753 20
Union Brewing Co., Ltd	"	13.	"									85 99
Capital Brewing Co., The	"	13.	Ottawa									369 70
Durocher, P. H	"	13.	"									14 11
Superior Brewing and Malting Co., The	"	13.	Port Arthur	238		31	219	78				85 92
Devlin, Felix	"	13.	Stratford	238		31	219	78				66 00
Clarke, L. H	"	13.	Kingston	238		31	219	78				2,324 95
Baxton, G	"	13.	Stratford	238		31	219	78				39 75
Kuntz, Barbara	"	13.	"	238		31	219	78				57 75
Watson, John	"	13.	"	238		31	219	78				158 75
Tellier, J. A	"	13.	St. Hyacinthe	238		31	219	78				42 75
Gooderham, W. G	"	16.	Toronto	238		31	219	78				983 42
O'Keefe, E	"	16.	"	238		31	219	78				2,154 87
Brain, Edwin	"	16.	"	238		31	219	78				166 10
Cosgrove, L. J	"	16.	"	238		31	219	78				975 96
Kormann, J. S	"	16.	"	238		31	219	78				27 00
Toronto Brewing and Malting Co	"	16.	"	238		31	219	78				801 75
Copland Brewing Co., Ltd	"	16.	"	238		31	219	78				1,836 35
Dominion Brewery Co., Ltd., The	"	16.	"	238		31	219	78				1,304 01
Anderton & Co	"	16.	"	238		31	219	78				131 92
Barrie Brewing Co., Ltd., The	"	16.	"	238		31	219	78				10 43

No. 16.—Refunds of Revenue—*Continued.*

EXCISE *Continued.*

Articles.	To whom paid.	Date.	Divisions.	Under what Authority Refunded.	Amounts.	Totals.
		1901.			$ cts.	$ cts.
Malt *Con*	Reinhardt, L	July 16	Toronto	Refunded under Revised Statutes, cap. 219, sec. 78	1,459 50	
	Davies, Thos	" 16	"	" " 219 " 78	120 21	
	Whitney, Abraham	" 16	"	" " 219 " 78	34 51	
	Kocot, Casimir	" 16	"	" " 219 " 78	195 75	
	Westbrook & Hacker	" 16	Brantford	" " 219 " 78	47 25	
	Otterbein, C	" 16	"	" " 219 " 78	125 42	
	Bixel, A	" 16	"	" " 219 " 78	339 45	
	Wiser, J. P	" 16	Prescott	" " 219 " 78	276 00	
	McCarthy, D. J	" 16	"	" " 219 " 78	480 22	
	Barrie, Robert	" 16	"	" " 219 " 78	305 21	
	Heisz, Lawrence	" 20	Windsor	" " 219 " 78	117 49	
	Farquharson & Grainger	" 20	Owen Sound	" " 219 " 78	90 00	
	Eaton, Christopher	" 20	"	" " 219 " 78	400 77	
	Heuther, Wm	" 20	"	" " 219 " 78	192 37	
	Schwan, Wm	" 20	"	" " 219 " 78	245 70	
	Taylor, H. J	" 20	St. Catharines	" " 219 " 78	597 16	
	White, F	" 20	"	" " 219 " 78	239 47	
	Silver Spring Brewery Ltd.,	" 20	Sherbrooke	" " 219 " 78	1,039 22	
	Wilson, M. S	" 20	Hamilton	" " 219 " 78	2,624 06	
	Grant's Spring Brewing Co	" 20	"	" " 219 " 78	1,112 34	
	Steed, Jas. J	" 20	"	" " 219 " 78	225 18	
	Irion, A. L	" 20	Windsor	" " 219 " 78	402 75	
	Schoenith, Geo	" 20	"	" " 219 " 78	18 90	
	Hiram Walker & Son's, Ltd	" 20	"	" " 219 " 78	1,829 18	
	Wilson, D. H	" 27	Toronto	" " 219 " 78	598 43	
	Calcutt, Henry	" 28	Peterboro	" " 219 " 78	314 55	
	Lutz, W. H	" 28	Guelph	" " 219 " 78	36 67	
	Sleeman Brewing and Malting Co., The	" 28	"	" " 219 " 78	494 32	
	Todd, M. U	" 28	"	" " 219 " 78	276 27	
	Holliday, T	" 28	"	" " 219 " 78	534 42	
	Heuther, C. N	" 28	"	" " 219 " 78	600 00	
	Rau, Mary	" 28	"	" " 219 " 78	185 77	
	Mace, A. Wm	" 28	"	" " 219 " 78	335 45	
	Bernhardt, V. P	" 28	"	" " 219 " 78	161 26	
	Bauer, E	" 28	"	" " 219 " 78	1,071 00	

	Sleeman, G. A.	"	28	"	"	"	219 " 78	96 00	
	Beauport Brewing Co., The.	"	28	Quebec	"	"	219 " 78	585 00	
	Boswell & Bros	"	28	"	"	"	219 " 78	1,207 41	
	Amyot & Gauvin	"	28	"	"	"	219 " 78	628 86	
	May, L. A.	"	28	Halifax	"	"	219 " 78	235 05	
	Wickwire, W. N.	"	28	"	"	"	219 " 78	1,474 50	
	Halifax Breweries, Ltd.	"	28	"	"	"	219 " 78	526 76	
	Shea, Patrick	"	29	Winnipeg	"	"	219 " 78	560 03	
	Blackwood, W.	"	29	"	"	"	219 " 78	124 86	
	Robinson, I. A.	"	29	"	"	"	219 " 78	82 65	
	Brandon Brewing Co., Ltd The	"	29	"	"	"	219 " 78	119 02	
	Witteman, K.	"	29	"	"	"	219 " 78	73 50	
	Drewry, E. L.	"	29	"	"	"	219 " 78	1,408 07	
	Tate, Robt	"	30	Victoria	"	"	219 " 78	3 00	
	Union Brewing Co., Ltd	"	30	"	"	"	219 " 78	243 09	
	Sutherland, J. P.	"	30	Vancouver	"	"	219 " 78	34 95	
	Nelson, N.	"	30	"	"	"	219 " 78	48 00	
	Imperial Brewing Co.	"	30	"	"	"	219 " 78	3 00	
	Vancouver Breweries, Ltd.	"	30	"	"	"	219 " 78	82 50	
	Sick, F.	"	30	Calgary	"	"	219 " 78	101 62	
	Oehsner, Robt.	"	30	"	"	"	219 " 78	70 50	
	Cross, A. E.	"	30	"	"	"	219 " 78	923 25	
	Winkler, W.	"	30	Vancouver	"	"	219 " 78	1 50	
	Kerrigan, James	"	30	"	"	"	219 " 78	3 03	
	Fairfield, W. S.	"	30	"	"	"	219 " 78	15 42	
		1903							73,921 12
Tobacco	Geo. E. Tuckett & Son, Co., Ltd., The	"	29	Hamilton	"	"	34 " 259	175 51	
	" "	"	29	"	"	"	29 " 78	2 50	
	Bauld Bros & Co	"	29	Halifax	"	"	31 " 238	46 28	
	Lemesurier, John	"	29	Quebec	"	"	34 " 270	12 29	
	Fortier, J. M., Ltd	"	29	Montreal	"	"	34 " 270	3 10	
	Grothé, L. O.	"	29	"	"	"	34 " 238	1,371 80	
	Bryan, G. F.	"	29	Winnipeg	"	"	34 " 238	452 50	
	Gardner, H. B.	"	31	Brantford	"	"	34 " 238	174 80	
	McKenna, A.	"	31	Picton	"	"	34 " 238	20 56	
	Macdonald, Sir W. C.	Aug.	4	Montreal	"	"	29 " 78	32 20	
	Kelly, Geo	"	1	London	"	"	29 " 78	4 10	
	American Tobacco Co. of Canada, Ltd., The	"	4	Montreal	"	"	34 " 270	108 70	
	McKenna, A.	"	4	Picton	"	"	34 " 238	156 72	
	Seaton, R. B., & Co.	"	7	Halifax	"	"	34 " 238	93 50	
	Dooley, J.	"	7	London	"	"	34 " 238	202 80	
	McKenna, A.	"	7	Picton	"	"	34 " 238	40 08	
	Wilson, Andrew	"	7	Toronto	"	"	34 " 238	203 10	
	Spilling, M. E.	"	7	"	"	"	34 " 238	215 90	
	Macdonald, Sir W. C.	"	14	Montreal	"	"	34 " 238	93 50	
	Goldstein, B.	"	14	"	"	"	34 " 259	46	
	Henry, James	"	14	"	"	"	34 " 259	11	

EXCISE *Continued.*

Articles.	To whom paid	Date.	Divisions.	Under what Authority Refunded.	Amounts.	Totals.
		1903.			$ cts.	$ cts.
Tobacco *Con.*	Ein, S.	Aug. 14	Montreal	Refunded under Revised Statutes, cap. 34, sec. 259	0 88	
	Solomon, E.	" 14	"	" " 34 " 259	4 59	
	Fortier, J. M., Ltd	" 14	"	" " 34 " 259	29 92	
	American Tobacco Co. of Canada, Ltd., The	" 14	"	" " 34 " 259	1,062 13	
	Isaacs, A.	" 14	St. John	" " 34 " 259	35 24	
	G. E. Tuckett & Son Co., Ltd The	" 14	Hamilton	" " 34 " 259	178 32	
	Tobin, John, & Co.	" 15	Halifax	" " 34 " 238	14 36	
	Weis, Frank	" 15	St. Catharines	" " 34 " 238	24 10	
	Schlueter, W. J.	" 18	Guelph	" " 34 " 238	105 20	
	McKenna, A.	" 18	Picton	" " 34 " 238	26 16	
	Tuckett Cigar Co., Ltd	" 19	Hamilton	" " 34 " 238	214 20	
	Wilberg, B.	" 19	Vancouver	" " 34 " 238	248 70	
	Seeton, R. B., & Co.	" 19	Halifax	" " 34 " 238	37 46	
	American Tobacco Co. of Canada, Ltd., The	" 19	Montreal	" " 34 " 238	96 70	
	Davis, S., & Sons	" 19	"	" " 34 " 238	166 80	
	Hirsch, J.	" 21	"	" " 34 " 238	16 87	
	Billman, Chisholm & Co.	" 24	Halifax	" " 34 " 238	124 45	
	Fortier, J. M., Ltd	" 24	Montreal	" " 34 " 238	11 32	
	" "	" 24	"	" " 34 " 238	1,318 90	
	Tobin, John & Co	" 24	Halifax	" " 34 " 238	116 98	
	Hobrecker,	" 25	"	" " 34 " 238	92 50	
	Kurtz & Co	" 27	Vancouver	" " 34 " 238	263 70	
	Hobrecker, A	" 28	Halifax	" " 34 " 238	259 51	
	Bauld Bros. & Co.	" 28	"	" " 34 " 238	60 41	
	McKenna, A.	" 29	Picton	" " 34 " 238	246 64	
	Miller & Lockwell	Sept. 2	Quebec	" " 29 " 78	171 00	
	Tremaine, S.	" 10	Halifax	" " 34 " 238	113 00	
	Tobin, John & Co	" 12	"	" " 34 " 238	35 64	
	Hobrecker, A	" 12	"	" " 34 " 238	2 86	
	Inland Cigar Mfg. Co.	" 12	Vancouver	" " 34 " 238	241 70	
	Henry, James	" 12	Montreal	" " 34 " 270	34 04	
	Donnelly, James	" 14	London	" " 34 " 238	53 90	
	Tobin, John & Co	" 15	Halifax	" " 34 " 238	93 34	
	G. E. Tuckett & Son Co., Ltd., The	" 21	Hamilton	" " 34 " 259	187 70	

Henry, James	21	Montreal			259		1	18
American Tobacco Co. of Canada, Ltd., The	21	"			259		1,043	06
Fortier, J. M., Ltd	21	"			259		333	31
Goldstein, B	21	"			259		5	25
Solomon, E	21	"			259		1	26
Bin, S	21	"			259		9	88
Ateshian, C	21	"			259		1	41
Isaacs, A	21	St. John			258		36	31
Kelly, Geo	21	London			258		139	30
Wilson, Andrew	21	Toronto			258		204	50
Seeton & Co., R. B	21	Halifax			258		17	49
Nicholson, D	21	Charlottetown			270		168	60
Isaacs, A	26	St. John			258		53	55
Nolan, J. F	26	London			258		109	50
Maguess, S. R	26	"			258		110	60
McNee, John	26	"			258		111	20
Smith, Jos	26	"			258		129	00
Breuer, A. H	26	"			258		241	30
McDonald, R. D	26	"			258		161	40
McKenna, A	26	Pictou			258		68	48
Seivert, J. G	28	Halifax			258		102	96
Henry, James	21	Montreal			270		36	35
Tobin, John & Co	21	Halifax			258		14	36
Macdonald, Sir W. C	21	Montreal			258		111	40
Fortier, J. M., Ltd	21	"			258		1,125	50
Flynn, F. L	21	Hamilton			258		115	20
Creed, J. N & Co	21	Halifax			258		7	25
Seivert, J. G	21	"			258		15	87
Hohecker, A	21	"			258		15	85
Blanchstein, C	21	Guelph			258		67	60
Milligan, Geo	21	Toronto			258		48	50
American Tobacco Co. of Canada, Ltd., The	9	Montreal			258		97	90
Seeton & Co., R. B	9	Halifax			258		15	84
Creed, J. N. & Co	9	"			258		169	70
McKenna, A	10	Pictou			258		180	40
Parr, T. J. & Co., Ltd	10	Brantford			258		178	90
Donohue, D	10	Hamilton			258		3	60
Fauld, Bros. & Co	12	Halifax			258		129	41
McKenna, A	12	Pictou			258		9	84
Donohue, D	11	Hamilton			258		65	10
Ateshian, C	19	Montreal			259		1	66
Henry, James	19	"			259		4	47
Goldstein, B	19	"			259		6	90
Bin, S	19	"			259		0	97
Solomon, E	19	"			259		1	49
Fortier, J. M., Ltd	19	"			259		28	59
American Tobacco Co. of Canada, Ltd., The	19	"			259		1,16	71

No. 16. —REFUNDS of Revenue—*Continued.*

EXCISE *Continued.*

Articles.	To whom paid.	Date.	Divisions.	Under what Authority Refunded.	Amounts.	Totals.
		1903.			$ cts.	$ cts.
Tobacco *Con.*	Isaacs, A.	Oct. 19..	St. John	Refunded under Revised Statutes, cap. 34, sec. 259.	53 70	
	G. E. Tuckett & Son, Co. Ltd., The	" 19..	Hamilton	" " 34 " 259	172 21	
	" "	" 19..	"	" " 29 " 78	6 55	
	Tobin, John & Co	" 19..	Halifax	" " 34 " 238	51 31	
	Seeton & Co., R. B	" 20..	"	" " 34 " 238	31 84	
	Bauld Bros. & Co	" 20..	"	" " 34 " 238	3 74	
	Dooley, James	" 23..	London	" " 34 " 238	359 30	
	Tuckett Cigar Co., The	" 23..	Hamilton	" " 34 " 238	557 60	
	Harkness, T.	" 29..	Montreal	" " 34 " 238	15 75	
	Macdonald, Sir W. C	" 29..	"	" " 31 " 238	5 20	
	McKenna, A	" 29..	Picton	" " 34 " 238	103 68	
	Billman, Chisholm & Co	" 29..	Halifax	" " 34 " 238	17 76	
	McHugh, John	" 29..	St. Catharines	" " 34 " 238	75 00	
	Schuster & Sons, Andrew	" 29..	Victoria	" " 34 " 238	21 90	
	Gold, T. F	" 29..	"	" " 34 " 238	83 50	
	Ateshian, C	" 29..	Montreal	" " 34 " 238	35 80	
	Tobin, John & Co	" 29..	Halifax	" " 34 " 238	10 77	
	Jacobs, H. & Co	" 29..	Montreal	" " 34 " 238	448 90	
	Hamilton, J. D	Nov. 2..	Stratford	" " 31 " 238	119 00	
	Kilbourne, W. P	" 2..	Winnipeg	" " 31 " 238	222 70	
	Firstbrook, Jas	" 5..	London	" " 34 " 238	2 50	
	Smith, J	" 5..	"	" " 31 " 238	2 00	
	G. E. Tuckett & Son Co., Ltd., The	" 11..	Hamilton	" " 31 " 238	1,431 88	
	" "	" 11..	"	" " 31 " 238	0 61	
	Creed J. N & Co.,	" 11..	Halifax	" " 34 " 238	9 75	
	Bollard, Arthur	" 11..	Toronto	" " 34 " 270	206 31	
	Ateshian, C	" 11..	Montreal	" " 34 " 270	19 80	
	McKenna, A	" 11..	Picton	" " 34 " 238	142 00	
	Bauld Bros. & Co	" 11..	Halifax	" " 34 " 238	5 68	
	Kelly, G	" 12..	London	" " 34 " 238	60 20	
	Douglass, H. M	" 12..	"	" " 34 " 238	80 90	
	Brener, A. H	" 12..	"	" " 34 " 238	138 50	
	Ward, W	" 12..	"	" " 34 " 238	212 40	
	Dyer, John J	" 12	"	" " 34 " 238	411 80	

SESSIONAL PAPER No. 12

Bell, Nathan	"	"	12	Calgary	"	"	31	238			104	20
Harkness, Thos.	"	"	13	Montreal	"	"	34	238			137	60
McDonald, R. D.	"	"	13	London	"	"	34	238			230	80
Wilson, Andrew	"	"	13	Toronto	"	"	34	238			208	50
Fortier, J. M., Ltd.	"	"	13	Montreal	"	"	34	270			3	78
"	"	"	13	"	"	"	34	238			1	50
Granatstein, M.	"	"	13	Toronto	"	"	31	270			3	80
Macdonald, Sir W. C.	"	"	13	Montreal	"	"	34	238			93	50
McKenna, A.	"	"	19	Picton	"	"	34	238			9	60
Baird Bros. & Co.	"	"	19	Halifax	"	"	34	238			1	87
Creed, J. N. & Co.,	"	"	19	"	"	"	34	238			176	77
Isaacs, A.	"	"	19	St. John	"	"	34	238			180	75
American Tobacco Co. of Canada, Ltd., The	"	"	19	Montreal	"	"	34	238			178	40
Ateshian, C.	"	"	19	"	"	"	34	259			3	24
Henry, Jas.	"	"	19	"	"	"	34	259			1	70
Goldstein, B.	"	"	19	"	"	"	34	259			10	20
Ein, S.	"	"	19	"	"	"	34	259			0	60
Solomon, E.	"	"	19	"	"	"	31	259			5	21
Fortier, J. M., Ltd.	"	"	19	"	"	"	34	259			25	92
American Tobacco Co. of Canada, Ltd., The	"	"	19	"	"	"	34	259			1,034	65
Isaacs, A.	"	"	19	St. John	"	"	31	259			21	73
G. E. Tuckett & Son Co., Ltd., The	"	"	19	Hamilton	"	"	31	259			157	92
Bhuenstell, I.	"	"	19	"	"	"	34	238			138	40
Daly, J. M.	"	"	19	London	"	"	31	238			98	50
Simon, H.	"	"	19	Montreal	"	"	31	238			113	80
Lally, James	"	"	28	Guelph	"	"	34	238			39	90
Tuckett Cigar Co., Ltd. The	"	"	28	Hamilton	"	"	34	238			201	90
Dooley, James	"	"	28	London	"	"	34	238			181	90
G. E. Tuckett & Son Co., Ltd., The	"	Dec.	5	Hamilton	"	"	34	238			776	61
Creed J. N & Co.,	"	"	5	Halifax	"	"	31	238			17	37
Baird Bros. & Co	"	"	5	"	"	"	34	238			76	17
Tobin, John & Co.	"	"	5	"	"	"	31	238			10	77
Macdonald, Sir W. C.	"	"	11	Montreal	"	"	34	238			111	10
Hobsecker, A.	"	"	11	Halifax	"	"	34	238			254	35
McKenna, A.	"	"	11	Picton	"	"	34	238			140	08
Ateshian, C.	"	"	11	Montreal	"	"	34	238			35	40
Oberholtfer, S.	"	"	11	Kingston	"	"	31	238			311	20
Milligan, Geo	"	"	11	Toronto	"	"	31	238			293	30
Fair, T. J., Co., Ltd.	"	"	11	Brantford	"	"	31	238			99	70
Creed, J. N., & Co.	"	"	11	Halifax	"	"	34	238			188	00
Fortier, J. M., Ltd.	"	"	11	Montreal	"	"	34	238			26	40
Creed, J. N., & Co.	"	"	11	Halifax	"	"	31	238			3	62
Geo. E. Tuckett & Son Co., Ltd., The	"	"	17	Hamilton	"	"	31	259			155	78
Ateshian, C.	"	"	17	Montreal	"	"	31	259			2	58

No. 16.– Refunds of Revenue—*Continued.*

EXCISE—*Continued.*

Articles.	To whom paid.	Date.	Divisions.	Under what Authority Refunded.	Amounts.	Totals.
		1903.			$ cts.	$ cts.
Tobacco—*Con.*	Henry, James	Dec. 17..	Montreal	Refunded under Revised Statutes, cap. 34, sec. 259	2 34	
	Goldstein, B	" 17..	"	" " 34 " 259	6 18	
	Oriental Tobacco Co.	" 17..	"	" " 24 " 259	1 47	
	Solomon, E.	" 17..	"	" " 34 " 259	3 85	
	Fortier, J. M., Ltd.	" 17..	"	" " 34 " 259	27 16	
	American Tobacco Co. of Canada, Ltd., The.	" 17..	"	" " 34 " 259	1,040 35	
	Isaacs, A.	" 17..	"	" " 34 " 259	24 59	
	G. E. Tuckett & Son Co., Ltd., The.	" 17..	Hamilton	" " 34 " 238	1,021 38	
	Ein, S	" 17..	Montreal	" " 34 " 259	0 66	
	Youngheart, Ed.	" 21..	"	" " 34 " 238	436 60	
	Fortier, J. M., Ltd.	" 21..	"	" " 34 " 238	1,314 40	
	Heinbecker, John	" 21..	Winnipeg	" " 34 " 238	155 10	
	Creed, J. N., & Co.	" 28..	Halifax	" " 34 " 238	24 50	
	McKenna, A	" 28..	Pictou	" " 34 " 238	45 68	
	Kelly, Geo.	" 28..	London	" " 34 " 238	111 80	
		1904.				
	Creed, J. N., & Co.	Jan. 7..	Halifax	" " 34 " 238	5 72	
	American Tobacco Co. of Canada, Ltd., The.	" 7..	Montreal	" " 34 " 238	197 70	
	McKenna, A.	" 7..	Pictou	" " 34 " 238	150 40	
	Wilson, Andrew.	" 7..	Toronto	" " 34 " 238	238 40	
	Fortier, J. M., Ltd.	" 7..	Montreal	" " 34 " 238	1,555 80	
	Daly, J. M.	" 9..	London	" " 34 " 238	65 80	
	Davis & Sons, S.	" 9..	Montreal	" " 34 " 238	341 00	
	Fortier, J. M., Ltd.	" 9..	"	" " 34 " 238	792 50	
	Geo. E. Tuckett & Son Co., Ltd.	" 18..	Hamilton	" " 34 " 238	590 73	
	Macdonald, Sir W. C.	" 18..	Montreal	" " 34 " 238	93 50	
	Isaacs, A.	" 20..	St. John	" " 34 " 238	104 62	
	Lemesurier, J.	" 20..	Quebec	" " 34 " 259	26 20	
	Goldstein, B	" 20..	Montreal	" " 34 " 259	2 73	
	Henry, James	" 20..	"	" " 34 " 259	2 91	
	Ateshian, C.	" 20..	"	" " 34 " 259	7 08	

Oriental Tobacco Co.	"	19	"	"	"	34	"	259	1 68
Ein, S.	"	19	"	"	"	34	"	259	1 20
Solomon, C.	"	19	"	"	"	34	"	259	4 76
Fortier, J. M., Ltd.	"	19	"	"	"	34	"	259	17 42
American Tobacco Co. of Canada, Ltd., The	"	19	"	"	"	34	"	259	1,074 06
Rock City Tobacco Co., The	"	19	"	"	"	34	"	259	85 41
Isaacs, A.	"	19	St. John	"	"	34	"	259	13 95
Geo. E. Tuckett & Son Co., Ltd., The	"	19	Hamilton	"	"	34	"	259	126 42
" "	"	19	"	"	"	29	"	78	4 55
Fortier, J. M., Ltd.	"	21	Montreal	"	"	34	"	238	11 05
Gold, Thos. F.	"	21	Victoria	"	"	34	"	238	8 87
Schnoter, A. & Sons	"	21	"	"	"	34	"	238	10 37
Levy, M. A.	"	21	"	"	"	34	"	238	21 37
Hynes, Jos.	"	21	Hamilton	"	"	34	"	238	78 50
Tuckett Cigar Co., Ltd., The	"	21	"	"	"	34	"	238	394 60
Brener, A. H.	"	21	London	"	"	34	"	238	187 20
Donnelly, James	"	21	"	"	"	34	"	238	64 60
McNee, John	"	21	"	"	"	34	"	238	231 30
McDonald, R. D.	"	21	"	"	"	34	"	238	256 10
Milligan, G.	"	21	Toronto	"	"	34	"	238	366 10
Jacobs, H. & Co.	"	21	Montreal	"	"	34	"	238	374 50
Barry, H. D.	"	21	Quebec	"	"	34	"	238	203 50
Dooley, Jas.	"	21	London	"	"	34	"	238	217 10
Tobin, John & Co.	"	22	Halifax	"	"	34	"	238	10 77
American Tobacco Co. of Canada, Ltd., The	"	23	Montreal	"	"	34	"	238	236 50
Hirsch, Jacob	"	23	"	"	"	34	"	238	346 50
Tansey, C. E.	"	26	St. Catharines	"	"	34	"	238	58 30
Smith, Jos.	"	26	London	"	"	34	"	238	135 30
Nolan, J. F.	"	26	"	"	"	34	"	238	221 30
Grothé, L. O.	"	26	Montreal	"	"	34	"	238	1,381 10
Hirsch, Jacob	"	26	"	"	"	34	"	238	9 37
Macdonald, Sir W. C.	"	27	"	"	"	29	"	78	45 50
Kelley, Geo.	"	27	London	"	"	29	"	78	3 10
Bollard, A.	"	28	Toronto	"	"	34	"	259	1 43
Creed, J. N. & Co.	"	30	Halifax	"	"	34	"	238	22 75
"	"	30	"	"	"	34	"	238	169 30
Tobin, John & Co.	Feb.	9	"	"	"	34	"	238	56 80
Bauld, Bros. & Co.	"	9	"	"	"	34	"	238	8 60
Hobrecker, A.	"	10	"	"	"	34	"	238	93 75
Whaley, H. R.	"	11	Windsor	"	"	34	"	238	39 20
Winterhalt, J. H.	"	11	Guelph	"	"	34	"	238	100 00
Fair, T. J. Co., Ltd.	"	11	Brantford	"	"	34	"	238	127 20
Harkness, Thos.	"	18	Montreal	"	"	34	"	238	23 87
Hobrecker, A.	"	18	Halifax	"	"	34	"	238	79 06
McKenna, A.	"	19	Picton	"	"	34	"	238	188 08
Ateshian, C.	"	19	Montreal	"	"	34	"	259	6 06

No. 16. Refunds of Revenue *Continued.*

EXCISE *Continued.*

Articles.	To whom paid.	Date.	Divisions.	Under what Authority Refunded.	Amounts.	Totals.
		1901.			$ cts.	$ cts.
Tobacco—*Con.*	Oriental Tobacco Co.	Feb. 19.	Montreal	Refunded under Revised Statutes, cap. 34, sec. 259	0 88	
	Goldstein, B.	" 19.	"	" " 34 " 259	0 95	
	Henry, Jas.	" 19.	"	" " 34 " 259	3 16	
	Ein, S.	" 19.	"	" " 34 " 259	0 96	
	Solomon, C.	" 19.	"	" " 34 " 259	4 13	
	Fortier, J. M., Ltd	" 19.	"	" " 34 " 259	11 93	
	American Tobacco Co. of Canada, Ltd., The	" 19.	"	" " 34 " 259	910 01	
	Isaacs, A	" 19.	St. John	" " 34 " 259	10 86	
	Geo. E. Tuckett & Son Co., Ltd, The	" 19.	Hamilton	" " 34 " 259	136 47	
	Bollard, A.	" 19.	Toronto	" " 34 " 259	1 07	
	Davis, S. & Sons	" 19.	Montreal	" " 34 " 238	135 90	
	Fortier, J. M., Ltd	" 19.	"	" " 34 " 238	1,366 20	
	Tuckett Cigar Co., Ltd., The	" 23.	Hamilton	" " 34 " 238	224 10	
	McKenna, A	" 23.	Pictou	" " 34 " 238	125 60	
	Tobin, John & Co.	" 25.	Halifax	" " 34 " 238	10 77	
	Creed, J. N. & Co.	" 25.	"	" " 34 " 238	3 62	
	American Tobacco Co. of Canada, Ltd., The	" 27.	Montreal	" " 34 " 238	173 85	
	Grothé, L. O	" 27.	"	" " 34 " 238	253 50	
	Tuckett Cigar Co., Ltd., The	Mar. 1.	Hamilton	" " 34 " 238	9 00	
	Billman, Chisholm & Co.	" 1.	Halifax	" " 34 " 238	22 66	
	Tobin, John & Co.	" 1.	"	" " 34 " 238	50 86	
	Creed, J. N. & Co.	" 1.	"	" " 34 " 238	157 77	
	Kimberley, G. F	" 2.	St. Catharines	" " 34 " 238	10 60	
	O'Brien, W.	" 2.	Windsor	" " 34 " 238	173 50	
	Hill, John	" 5.	Hamilton	" " 34 " 238	59 20	
	Youngheart, Ed	" 5.	Montreal	" " 34 " 238	294 50	
	McKenna, A	" 5.	Pictou	" " 34 " 238	177 12	
	Creed, J. N. & Co.	" 5.	Halifax	" " 34 " 238	23 39	
	Hobrecker, A.	" 10.	"	" " 34 " 238	28 25	
	Geo. E. Tuckett & Son, Co; Ltd., The	" 10.	Hamilton	" 34 " 238	920 80	

Hobrecker, A.	"	12..	Halifax	"	"	34	"	238	17 62
Brener, A. H.	"	14..	London	"	"	34	"	238	4 10
Macdonald, Sir W. C.	"	15..	Montreal	"	"	34	"	238	112 20
Tuckett Cigar Co., Ltd., The	"	15..	Hamilton	"	"	34	"	238	36 40
Tuckett, G. T.	"	15..	Montreal	"	"	34	"	238	366 90
Sievert, J. G.	"	16..	Halifax	"	"	34	"	238	103 75
Oriental Tobacco Co.	"	17..	Montreal	"	"	34	"	259	97
Henry, James	"	17..	"	"	"	34	"	259	2 45
Goldstein, B.	"	17..	"	"	"	34	"	259	3 85
Ateshian, C.	"	17..	"	"	"	34	"	259	3 19
Ein, S	"	17..	"	"	"	34	"	259	1 34
Solomon, E.	"	17..	"	"	"	34	"	259	4 05
Fortier, J. M., Ltd	"	17..	"	"	"	34	"	259	11 65
American Tobacco Co. of Canada, Ltd.	"	17..	"	"	"	34	"	259	1,111 53
Geo. E. Tuckett & Son Co., Ltd., The	"	17..	Hamilton	"	"	34	"	259	150 68
Isaacs, A.	"	17..	St. John	"	"	34	"	259	10 13
Hobrecker, A.	"	19..	Halifax	"	"	34	"	238	162 73
Ripstein Bros.	"	19..	Winnipeg	"	"	34	"	238	54 00
Simon, H	"	19..	Montreal	"	"	34	"	238	97 20
Wilson, Andrew	"	22..	Toronto	"	"	34	"	238	258 50
Tobin, John & Co	"	22..	Halifax	"	"	34	"	238	10 77
Hobrecker, A.	"	23..	"	"	"	34	"	238	29 50
McDonald, R. D	"	23..	London	"	"	34	"	238	322 20
Davis, S. & Sons	"	23..	Montreal	"	"	34	"	238	381 20
Kelly, Geo.	"	24..	London	"	"	34	"	238	87 50
Billman, Chisholm & Co.	"	24..	Halifax	"	"	34	"	238	19 80
Hobrecker, A.	"	24..	"	"	"	34	"	238	6 25
Billman, Chisholm & Co	"	26..	"	"	"	34	"	238	38 21
Ward, W.	"	29..	London	"	"	34	"	238	83 70
Tuckett Cigar Co., Ltd., The	"	29..	Hamilton	"	"	34	"	238	308 80
Jacob, H. & Co.	"	29..	Montreal	"	"	34	"	238	351 80
Creed J. N & Co.,	Apl.	6..	Halifax	"	"	34	"	238	201 50
Gorham J. W & Co.	"	6..	"	"	"	34	"	238	8 60
McKenna, A.	"	6..	Pictou	"	"	34	"	238	21 12
American Tobacco Co. of Canada, Ltd., The	"	6..	Montreal	"	"	34	"	238	552 80
Fair, T. J. Co., Ltd	"	6..	Brantford	"	"	34	"	238	151 70
Dooley, James	"	6..	London	"	"	34	"	238	330 10
Milligan, G.	"	6..	Toronto	"	"	34	"	238	525 70
Fortier, J. M., Ltd	"	6..	Montreal	"	"	34	"	238	1,587 50
Creed, J. N. & Co.	"	13..	Halifax	"	"	34	"	238	39 60
Smith, Jos.	"	13..	London	"	"	34	"	238	121 30
Nolan, J. F.	"	13..	"	"	"	34	"	238	135 80
McNee, John	"	13..	"	"	"	34	"	238	190 00
Brener, A. H.	"	13..	"	"	"	34	"	238	248 10
Fair, T. J. Co., Ltd	"	15..	Brantford	"	"	34	"	238	4 10

No. 16.—Refunds of Revenue—*Continued.*

EXCISE—*Continued.*

Articles.	To whom paid.	Date.	Divisions.	Under what Authority Refunded.	Amounts.	Totals.
		1904.			$ cts.	$ cts.
Tobacco—*Con.*	Nolan, J. F.	April 15	London.	Refunded under Revised Statutes, cap. 34, sec. 238	11 10	
	Ateshian, C.	" 16	Montreal.	" " 34 " 259	5 58	
	Bollard, Arthur.	" 16	Toronto.	" " 34 " 259	1 92	
	Henry, Jas.	" 16	Montreal.	" " 34 " 259	3 49	
	Goldstein, B.	" 16	"	" " 34 " 259	4 62	
	Ein, S.	" 16	"	" " 34 " 259	1 31	
	Solomon, E.	" 16	"	" " 34 " 259	4 86	
	Fortier, J. M., Ltd.	" 16	"	" " 34 " 259	16 97	
	American Tobacco Co. of Canada, Ltd., The.	" 16	"	" " 34 " 259	1,239 66	
	Isaacs, A.	" 16	St. John.	" " 34 " 259	10 86	
	Oriental Tobacco Co.	" 21	Montreal.	" " 34 " 259	2 75	
	McKenna, A.	" 21	Pictou.	" " 34 " 238	167 76	
	McHugh, John.	" 21	St. Catharines.	" " 34 " 238	42 20	
	Daly, J. M.	" 21	London.	" " 34 " 238	65 00	
	Taylor, John.	" 26	Toronto.	" " 34 " 238	103 30	
	Tuckett Cigar Co., Ltd., The.	" 26	Hamilton.	" " 34 " 238	71 40	
	Blumenstiel, I.	" 26	"	" " 34 " 238	169 90	
	G. Tuckett & Son Co., Ltd., The.	" 26	"	" " 34 " 259	154 82	
	" "	" 26	"	" " 29 " 78	3 00	
	McKenna, A.	" 26	Pictou.	" " 34 " 238	50 00	
	Bauld, Bros. & Co.	" 26	Halifax.	" " 34 " 238	1 72	
	Hobrecker, A.	" 26	"	" " 34 " 238	29 37	
	Henry, James.	" 29	Montreal.	" " 34 " 270	18 00	
	G. E. Tuckett & Son Co., Ltd., The.	" 29	Hamilton.	" " 34 " 238	916 07	
	Tobin, John & Co.	" 29	Halifax.	" " 34 " 238	10 77	
	American Tobacco Co. of Canada, Ltd., The.	May 4	Montreal.	" " 34 " 238	65 00	
	Hobrecker, A.	" 7	Halifax.	" " 34 " 238	80 92	
	Creed, J. N. & Co.	" 7	"	" " 34 " 238	207 00	
	Smith, Jos.	" 7	London.	" " 34 " 238	102 80	
	Dyer, J. J.	" 7	"	" " 34 " 238	120 10	
	McDonald, R. D.	" 7	"	" " 34 " 238	316 30	

Wilson, Andrew	"	7	Toronto	"	"	34	"	238	311	10
Fortier, J. M., Ltd	"	11	Montreal	"	"	34	"	238	310	00
McKenna, A	"	11	Pictou	"	"	34	"	832	312	08
Creed, J. N. & Co	"	16	Halifax	"	"	34	"	238	4	31
McKenna, A	"	16	Pictou	"	"	34	"	238	19	52
Bollard, Arthur	"	16	Toronto	"	"	34	"	259	1	41
Lemesurier, John	"	16	Quebec	"	"	34	"	259	11	16
Oriental Tobacco Co.	"	16	Montreal	"	"	34	"	259		55
Goldstein, B	"	16	"	"	"	34	"	259	5	54
Ateshian, C	"	16	"	"	"	34	"	259	4	80
Ein, S	"	16	"	"	"	34	"	259	0	84
Solomon, E	"	16	"	"	"	34	"	259	4	73
Fortier, J. M., Ltd	"	16	"	"	"	34	"	259	10	26
American Tobacco Co. of Canada, Ltd., The	"	16	"	"	"	34	"	259	1,118	82
G. E. Tuckett & Son Co., Ltd., The	"	16	Hamilton	"	"	34	"	259	141	94
Isaacs, A	"	16	St. John	"	"	34	"	259	16	11
McGowan, G. A	"	16	Kingston	"	"	34	"	238	454	30
Creed, J. N. & Co	"	17	Halifax	"	"	34	"	238	27	75
McKenna, A	"	17	"	"	"	34	"	238	112	64
Simon, H	"	20	Montreal	"	"	34	"	238	1	30
Dooley, James	"	20	London	"	"	34	"	238	12	20
Gignac, R. T	"	20	Windsor	"	"	34	"	238	24	50
McKenna, A	"	21	Pictou	"	"	24	"	238	57	44
Henry, James	"	21	Montreal	"	"	34	"	238	3	20
Jacobs, H. & Co	"	21	"	"	"	34	"	238	291	40
Webster, W. R	"	21	Sherbrooke	"	"	34	"	238	319	80
Payne, J. B	"	21	"	"	"	34	"	238	185	60
Tuckett Cigar Co., Ltd., The	"	21	Hamilton	"	"	34	"	238	344	90
Dooley, James	"	21	London	"	"	34	"	238	243	80
Bolger, M. J	"	21	Toronto	"	"	34	"	238	47	10
Barnheart, D. T	"	21	Victoria	"	"	34	"	238	215	30
Jones, Patrick	"	21	Montreal	"	"	34	"	238	250	50
Tuckett, G. T	"	21	"	"	"	34	"	238	335	40
McKenna, A	"	30	Pictou	"	"	34	"	238	12	86
Hobrecker, A	June	6	Halifax	"	"	34	"	238	41	56
Tuckett Cigar Co., Ltd., The	"	6	Hamilton	"	"	34	"	238	39	73
Nicholson, D	"	6	Charlottetown	"	"	34	"	238	25	19
American Tobacco Co. of Canada, Ltd., The	"	6	Montreal	"	"	34	"	270	174	40
Macdonald, Sir W. C	"	11	"	"	"	34	"	238	242	00
Lally, James	"	11	Guelph	"	"	34	"	238	23	00
Simon, Leiser & Co	"	14	Victoria	"	"	34	"	238	211	33
Tietjen, W	"	14	Vancouver	"	"	34	"	238	307	40
Billman, Chisholm & Co	"	16	Halifax	"	"	34	"	238	50	86
Creed, J. N. & Co	"	16	"	"	"	34	"	238	99	00
Hobrecker, A	"	16	"	"	"	34	"	238	29	37

EXCISE *Concluded.*

Articles.	To whom paid.	Date.	Divisions.	Under what Authority Refunded.	Amounts.	Totals.
		1904.			$ cts.	$ cts.
Tobacco *Con.*	American Tobacco Co. of Canada, Ltd., The.	June 16.	Montreal	Refunded under Revised Statutes, cap. 34, sec. 238	86 50	
	Bollard, A	" 16.	Toronto	" " 34 " 259	1 62	
	Goldstein, B	" 16.	Montreal	" " 34 " 259	2 73	
	Henry, James	" 16.	"	" " 34 " 259	3 25	
	Ateshian, C	" 16.	"	" " 34 " 259	0 13	
	Ein, S	" 16.	"	" " 34 " 259	0 97	
	Solomon, E	" 16.	"	" " 34 " 259	5 24	
	Fortier, J. M., Ltd	" 16.	"	" " 31 " 259	25 44	
	American Tobacco Co. of Canada, Ltd., The	" 16.	"	" " 34 " 259	1,005 25	
	Isaacs, A	" 16.	St. John	" " 34 " 259	19 22	
	G. E. Tuckett & Son Co., Ltd., The	" 16.	Hamilton	" " 34 " 259	154 76	
	Creed, J. N. & Co	" 17.	Halifax	" " 34 " 238	207 80	
	Hobrecker, A	" 17.	"	" " 31 " 238	64 86	
	McKenna, A	" 21.	Pictou	" " 34 " 238	279 16	
	G. E. Tuckett & Son Co., Ltd., The	" 21.	Hamilton	" " 34 " 270	44 66	
	Henry, James	July 4.	Montreal	" " 34 " 270	7 80	
	Isaacs, A	" 4.	St. John	" " 34 " 238	3 00	
	McKenna, A	" 4.	Pictou	" " 34 " 238	13 44	
	Milligan, G	" 4.	Toronto	" " 34 " 238	584 00	
	McKenna, A	" 4.	Pictou	" " 34 " 238	16 80	
	Bollard, Arthur	" 7.	Toronto	" " 34 " 259	1 48	
	Hamilton, John D.	" 7.	Stratford	" " 31 " 238	60 00	
	Schlueter, W. J	" 7.	Guelph	" " 31 " 238	103 40	
	Tuckett, G. T	" 7.	Montreal	" " 31 " 238	209 90	
	Nicholson, D	" 8.	Charlottetown	" " 31 " 259	8 99	
	Geo. E. Tuckett & Son Co., Ltd., The	" 9.	Hamilton	" " 34 " 259	160 00	
	" "	" 9.	"	" " 29 " 78	5 35	
	Dyer, John J	" 12.	London	" " 29 " 78	60 90	
	Macdonald, Sir W. C	" 12.	Montreal	" " 29 " 78	127 70	
	G. E. Tuckett & Son Co., Ltd., The	" 18.	Hamilton	" " 31 " 238	481 21	
	Creed, J. N. & Co	" 18.	Halifax	" " 31 " 238	188 00	
	Gardner, H. B	" 18.	"	" " 34 " 238	189 50	
	Nolan, J. F.	" 18.	London	" " 31 " 238	168 20	

	Dooley, James	"	18..	"	"	"	34	"	238	278	40		
	Fair, T. J. Co., Ltd	"	20..	Brantford	"	"	34	"	238	128	30		
	Ward, W	"	20..	London	"	"	34	"	238	165	00		
	Daly, J. M	"	20..	"	"	"	34	"	238	61	90		
	Fortier, J. M., Ltd	"	20..	Montreal	"	"	34	"	238	1,601	90		
	McKenna, A	"	20..	Pictou	"	"	34	"	238	98	08		
	Ateshian, C	"	20..	Montreal	"	"	34	"	259	1	86		
	Oriental Tobacco Co	"	20..	"	"	"	34	"	259		95		
	Henry, James	"	20..	"	"	"	34	"	259	1	95		
	Goldstein, B	"	20..	"	"	"	34	"	259	7	67		
	Ein, S	"	20..	"	"	"	34	"	259	1	15		
	Solomon, E	"	20..	"	"	"	34	"	259	6	69		
	Fortier, J. M., Ltd	"	20..	"	"	"	34	"	259	9	56		
	American Tobacco Co., Ltd., The	"	20..	"	"	"	34	"	259	1,205	66		
	Isaacs, A	"	20..	St. John	"	"	34	"	259	14	87		
	Bollard, Arthur	"	25..	Toronto	"	"	34	"	238	175	90		
	Wilson, Andrew	"	25..	"	"	"	34	"	238	351	00		
	Wartig, B. J	"	25..	London	"	"	34	"	238	16	10		
	Atkins, Wm	"	25..	"	"	"	34	"	238	17	60		
	Smith, Jos	"	25..	"	"	"	34	"	238	109	10		
	Dyer, John J	"	25..	"	"	"	34	"	238	115	50		
	Kelly, Geo	"	25..	"	"	"	34	"	238	156	90		
	McNee, John	"	25..	"	"	"	34	"	238	251	80		
	McDonald, R. D	"	25..	"	"	"	34	"	238	316	80		
	Lemesurier, J	"	27..	Quebec	"	"	34	"	259	6	62		
	Douglas, H. M	"	27..	London	"	"	34	"	238	12	80		
	Creed, J. N. & Co	"	27..	Halifax	"	"	34	"	238	70	82		
										77,432	85		
		1903.				Less refund				10	77		
												77,422	08
Cigars	Fortier, J. M., Ltd	Aug.	24..	Montreal									0 26
Manufact'res in Bond	Excelsior Vinegar Co	Dec.	31..	St. John, N.B									41 28
Officer's salary	Allen, S	Sept.	2..	Brantford									300 00
		1904.											
Bonded Warehouse License	Ranger, D. V. & Co	July	12..	Ottawa									10 00
Other receipts	O'Brien Brewing and Malting Co	"	12..	Yukon District									355 12
		1903.				Total of Excise Revenue Refunds							232,753 61
Electric light revenue	Chevrier, J. (The Rev.)	Dec.	31..	Three Rivers									1 00
						Grand Total							232,754 61

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

W. J. GERALD,
Deputy Minister.

DR. No. 17.—DEPARTMENTAL EXPENSES CR.

(For Details, see Appendix B.)

Due by sundry persons, July 1, 1903.	Disbursed by the Receiver General.	Deductions for			Totals.	——	Salaries.	Contingencies.	Due by sundry persons, June 30, 1904.	Totals.
		Superannuation.	Insurance.	Retirement.						
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.
	7,182 81				7,182 81	Minister of Inland Revenue	7,000 00	182 81		7,182 81
	37,040 45	624 96	116 40	259 10	38,040 91	Departmental officers	37,792 11	248 80		38,040 91
	254 66				254 66	Subscription to newspapers		254 66		254 66
	1,268 60				1,268 60	Extra clerks, &c.		1,268 60		1,268 60
	306 22				306 22	Telegraph companies and telephone		306 22		306 22
	2,861 33				2,861 33	Stationery		2,861 33		2,861 33
	1 00				1 00	Books and maps		1 00		1 00
	1,001 77				1,001 77	Printing and lithographing		1,001 77		1,001 77
	34 35				34 35	Postage		34 35		34 35
16 66	278 68				295 34	Sundry persons		278 68	16 66	295 34
16 66	50,229 87	624 96	116 40	259 10	51,246 99	Totals	44,792 11	6,438 22	16 66	51,246 99

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

WEIGHTS AND MEASURES, GAS, ELECTRIC LIGHT AND LAW STAMPS.

No. 18.—STATEMENT showing amount of Revenue accrued during Year ended June 30, 1904.

DR.

—	Weights and Measures Stamps.	Gas Stamps.	Electric Light Stamps	Law Stamps.				Totals.
				Supreme Court.	Exchequer Court.	Yukon Territorial Court.	Yukon Mining Court.	
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
To amount of stamps destroyed or returned by distributors.....	46 95	.....	.....	.....	.....	.....	.....	46 95
To commission allowed	.....	.....	.....	72 50	179 99	.....	.....	252 49
To amount of stamps remaining in hands of distributors, June 30, 1904..	49,335 14	28,186 55	36,375 75	.....	.....	24,387 75	4,200 25	142,485 44
To balance, being the revenue during 1903-1904	66,405 51	26,955 00	19,022 25	1,377 50	3,419 81	10,266 25	1,942 75	129,389 07
Totals.....	115,787 60	55,141 55	55,398 00	1,450 00	3,599 80	34,654 00	6,143 00	272,173 95

CR.

—	Weights and Measures Stamps.	Gas Stamps.	Electric Light Stamps.	Law Stamps.				Totals.
				Supreme Court.	Exchequer Court.	Yukon Territorial Court.	Yukon Mining Court.	
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
By amount of stamps in the hands of distributors on July 1, 1903...	50,305 60	29,054 05	36,248 00	.....	.....	13,154 00	2,643 00	131,404 65
By stamps issued by Inland Revenue Department during the year... .	65,482 00	26,087 50	19,150 00	1,450 00	3,599 80	21,500 00	3,500 00	140,769 30
Totals	115,787 60	55,141 55	55,398 00	1,450 00	3,599 80	34,654 00	6,143 00	272,173 95

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

WEIGHTS AND MEASURES, 1903–1904.

DR. No. 19 (A).—Inspection Divisions in Account with Revenue. CR.

Balances due by Inspectors, July 1, 1903.		Stamps issued to Inspectors.	Seizures and Penalties.	Other Receipts.	Totals.	Divisions.	Stamps returned or destroyed.	Deposited to the credit of the Receiver General.	Balances due by Inspectors, June 30, 1904.		Totals.
Stamps on hand.	Cash on hand.								Stamps on hand.	Cash on hand.	
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
3,691 30		1,675 00			5,369 30	Belleville	21 80	3,352 05	1,995 45		5,369 30
4,835 49		8,044 00			12,879 49	Hamilton		8,781 48	4,098 01		12,879 49
2,100 96		9,082 00			11,182 96	Ottawa	3 00	8,587 65	2,592 31		11,182 96
3,351 28		8,910 00	5 00		12,266 28	Toronto		6,834 12	5,432 16		12,266 28
3,792 34		9,090 00			12,882 34	Windsor		9,540 74	3,341 60		12,882 34
17,771 37		36,801 00	5 00		54,580 37	*Ontario*	24 80	37,096 04	17,459 53		54,580 37
13,379 48		7,955 00	25 00	15 00	21,374 48	Montreal		9,363 38	12,011 10		21,374 48
3,280 00		4,062 50			7,342 50	Quebec		3,701 35	3,641 15		7,342 50
2,508 00		3,407 00			5,915 00	St. Hyacinthe		2,893 59	3,020 41	1 00	5,915 00
3,956 45					3,956 45	Three Rivers		1,445 59	2,510 86		3,956 45
23,123 93		15,424 50	25 00	15 00	38,588 43	*Quebec*		17,403 91	21,183 52	1 00	38,588 43
1,640 11		2,799 00			1,439 11	*St. John, N.B.*		2,168 70	2,260 16	10 25	4,439 11
194 59		790 00			984 59	Cape Breton	20 65	637 11	326 83		984 59
818 49		1,380 00			2,198 49	Halifax		1,183 41	1,015 08		2,198 49
981 77		690 00			1,671 77	Pictou	1 50	444 65	1,141 55	84 07	1,671 77
1,994 85		2,860 00			4,854 85	*Nova Scotia*	22 15	2,265 17	2,483 46	84 07	4,854 85
509 84		515 00			1,024 84	*Charlottetown, P.E.I.*		378 63	646 21		1,024 84

3,745 16	......	5,675 00	......	......	9,420 16	Winnipeg, Man	......	5,269 49	4,150 67	......	9,420 16
678 49	......	450 00	......	......	1,128 49	Calgary, N.W.T.	......	753 20	375 29	......	1,128 49
838 85	......	957 50	......	......	1,796 35	Victoria, B.C.	......	1,020 05	776 30	......	1,796 35
50,305 60	......	65,182 00	30 00	15 00	115,832 60	Grand Totals	46 95	66,355 19	49,335 11	95 32	115,832 60

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

W. J. GERALD,
Deputy Minister.

WEIGHTS AND MEASURES, 1903–1904.

No. 19 (B).—Deputy Inspectors of the Old Divisions in Account with Revenue.

Dr.				Cr.
Balances due July 1, 1903. — Cash on hand.	Totals.	Divisions.	Balances due June 30, 1904. — Cash on hand.	Totals.
$ cts.	$ cts.		$ cts.	$ cts.
87 10	87 10	Essex	87 10	87 10
87 10	87 10	*Ontario*	87 10	87 10
5 62	5 62	Hull	5 62	5 62
5 62	5 62	*Quebec*	5 62	5 62
92 72	92 72	Totals	92 72	92 72

W. J. GERALD.
Deputy Minister.

Inland Revenue Department,
Ottawa, August 19, 1904.

WEIGHTS AND MEASURES, 1903–1904.

DR. No. 20 (A).—INSPECTION DIVISIONS in Account with Expenditures. CR.

Amounts received from Department to meet Expenditures.	Deductions from Salaries for			Totals.	Divisions.	Expenditures Authorized by the Department.					Totals.
	Superannuation.	Insurance.	Guarantee			Salaries.	Special Assistance	Rent.	Travelling Expenses.	Sundries.	
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
5,595 29	51 92	.....	9 17	5,656 38	....Belleville.	2,908 02	666 35	345 00	1,158 75	578 26	5,656 38
8,026 56	32 08	.....	16 20	8,074 84	... Hamilton ...	6,699 76	.....	.....	1,263 96	111 12	8,074 84
6,271 23	13 96	10 44	11 85	6,307 48	... Ottawa.	4,316 40	308 18	250 00	1,232 67	200 23	6,307 48
6,134 84	16 04	.....	10 80	6,161 68	...Toronto ..	1,299 80	.....	.....	1,707 42	154 46	6,161 68
5,616 48	28 04	.....	9 00	5,653 52	....Windsor...	3,799 76	.....	.....	1,654 73	199 03	5,653 52
31,644 40	142 04	10 44	57 02	31,853 90	.....*Ontario*.....	22,023 74	974 53	595 00	7,017 53	1,243 10	31,853 90
8,527 68	61 30	.....	15 90	8,604 88	....Montreal	6,866 28	.....	126 75	1,278 48	333 37	8,604 88
8,104 54	80 56	38 28	15 90	8,239 28	....Quebec.....	6,449 76	.....	.....	1,532 03	257 49	8,239 28
4,669 65	.....	.....	9 00	4,678 65	....St. Hyacinthe	2,849 88	499 92	.....	1,234 20	94 65	4,678 65
2,245 89	.....	.....	5 40	2,251 29	...Three Rivers.....	1,549 92	.....	.....	691 71	9 66	2,251 29
23,547 76	141 86	38 28	46 20	23,774 10	..... *Quebec*.....	17,715 84	499 92	126 75	1,736 42	695 17	23,774 10
3,195 04	15 96	.....	8 78	3,519 78	.....*St. John, N.B*.....	2,954 78	.....	.....	458 56	106 44	3,519 78
1,311 18	.....	.....	3 60	1,314 78	....Cape Breton.....	850 00	.....	50 00	394 45	20 33	1,314 78
3,330 86	.....	.....	5 40	3,336 26	...Halifax	1,599 96	799 92	300 00	461 68	174 70	3,336 26
1,846 77	19 96	.....	5 40	1,872 13	....Pictou	1,649 92	.....	.....	152 41	69 80	1,872 13
6,488 81	19 96	.....	14 40	6,523 47	.....*Nova Scotia*.....	4,099 88	799 92	350 00	1,008 54	264 83	6,523 17
1,778 67	.....	.....	5 40	1,784 07	.....*Charlottetown, P.E.I*.....	1,549 92	.....	.....	154 11	79 74	1,784 07

WEIGHTS AND MEASURES, 1903-1904.

Dr. No. 20 (A). Inspection Divisions in Account with Expenditures. Cr.

Amounts received from Department to meet Expenditures.	Deductions from Salaries for			Totals.	Divisions.	Expenditures Authorized by the Department.					Totals.
	Superannuation.	Insurance.	Guarantee.			Salaries.	Special Assistance	Rent.	Travelling Expenses.	Sundries.	
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
6,000 47	4 04	.....	13 20	6,017 71	....Winnipeg	3,921 39	378 31	.....	1,579 41	138 60	6,017 71
1,252 82	15 00	.....	5 40	1,273 22	...Calgary	949 92	.....	.....	323 30	.....	1,273 22
7,253 29	19 04	.....	18 60	7,290 93	.....*Manitoba and N. W. Territories.*	4,871 31	378 31	.....	1,902 71	138 60	7,290 93
3,630 11	.....	.....	7 20	3,637 61	.....*Victoria, B.C.*	1,849 80	.....	180 00	1,484 86	122 95	3,637 61
3,146 15	.....	.....	.....	3,146 15	....Chief Inspector.	2,500 00	.....	.....	629 85	16 30	3,146 15
1,888 51	.....	.....	.....	1,888 51	....General contingencies.	.....	.....	.....	.....	1,888 51	1,888 51
425 33	.....	.....	.....	425 33	...Metric system	.....	.....	.....	.....	425 33	425 33
746 97	.....	.....	.....	746 97	..Printing	.....	.....	.....	.....	746 97	746 97
178 30	.....	.....	.....	178 30	..Stationery	.....	.....	.....	.....	178 30	178 30
84,223 64	338 86	18 72	157 60	84,768 82	.....Grand Totals.	57,565 27	2,652 68	1,254 75	17,392 88	5,906 21	84,768 82

Inland Revenue Department,
Ottawa, August 19, 1904.

W. J. GERALD,
Deputy Minister.

WEIGHTS AND MEASURES, 1903-1904

DR. No. 20 (B).—OLD INSPECTION DIVISIONS in Account with Expenditures. CR.

Balances due by sundry persons, July 1, 1903.	Totals.	Divisions.	Balances due by sundry persons, June 30, 1904.	Totals.
$ cts.	$ cts.		$ cts.	$ cts.
39 56	39 56	Essex	39 56	39 56
33 53	33 53	Waterloo	33 53	33 53
73 09	73 09	*Ontario*	73 09	73 09
0 33	0 33	Drummond	0 33	0 33
41 45	41 45	Laval	41 45	41 45
26 88	26 88	Montmorency	26 88	26 88
27 51	27 51	Richelieu	27 51	27 51
96 17	96 17	*Quebec*	96 17	96 17
24 00	24 00	Lunenburg, Nova Scotia	24 00	24 00
193 26	193 26	Totals	193 26	193 26

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

W. J. GERALD,
Deputy Minister.

No. 21.—GAS INSPECTION, 1903–1904.

Inspection Districts in Account with Revenue.

Dr. Balances due by Inspectors, July 1, 1903. Stamps on hand.	Dr. Balances due by Inspectors, July 1, 1903. Cash on hand.	Dr. Stamps issued to Inspectors.	Dr. Penalties.	Dr. Other Receipts.	Dr. Totals.	Districts.	Cr. Deposited to the credit of the Receiver General.	Cr. Balances due by Inspectors, June 30, 1904. Stamps on hand.	Cr. Balances due by Inspectors, June 30, 1904. Cash on hand.	Cr. Totals.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.
751 50					751 50	Barrie	65 50	686 00		751 50
739 75					739 75	Belleville	145 50	594 25		739 75
548 50		475 00			1,023 50	Berlin	274 50	749 00		1,023 50
345 25		825 00			1,170 25	Brockville	369 75	800 50		1,170 25
309 00					309 00	Cobourg	130 00	179 00		309 00
190 75					190 75	Cornwall	60 00	130 75		190 75
426 25		150 00			576 25	Guelph	250 50	325 75		576 25
1,917 00		3,312 50			5,229 50	Hamilton	3,128 25	2,101 25		5,229 50
624 00		200 00			824 00	Kingston	196 00	628 00		824 00
186 00					186 00	Listowel	14 75	141 25		186 00
799 25		3,750 00	5 00		4,554 25	London	2,733 25	1,821 00		4,554 25
68 75		262 50			331 25	Napanee	100 00	231 25		331 25
2,013 50		875 00			2,888 50	Ottawa	670 50	2,218 00		2,888 50
423 75					423 75	Owen Sound	132 50	291 25		423 75
931 50					931 50	Peterborough	137 50	794 00		931 50
620 75		250 00			870 75	Sarnia	261 75	609 00		870 75
1,030 50		175 00			1,205 50	Stratford	177 75	1,027 75		1,205 50
3,334 05		7,000 00			10,334 05	Toronto	6,991 00	3,343 05		10,334 05
15,260 05		17,275 00	5 00		32,540 05	*Ontario*	15,869 00	16,671 05		32,540 05
1,472 75		7,675 00			9,147 75	Montreal	8,013 25	1,134 50		9,147 75
565 75					565 75	Quebec	318 75	247 00		565 75
372 50					372 50	Sherbrooke	36 00	336 50		372 50
1,176 50					1,176 50	St. Hyacinthe	97 75	1,078 75		1,176 50
3,587 50		7,675 00			11,262 50	*Quebec*	8,465 75	2,796 75		11,262 50
758 00					758 00	Fredericton	51 50	706 50		758 00
1,102 25		250 00			1,352 25	St. John	505 50	846 75		1,352 25
1,860 25		250 00			2,110 25	*New Brunswick*	557 00	1,553 25		2,110 25

1,752 50		250 00		2,002 50	*Halifax, N. S.*	496 50	1,506 00	2,002 50
896 25		25 00		921 25	*Charlottetown, P. E. I*	130 50	790 75	921 25
1,306 25		437 50		1,743 75	*Winnipeg, Man.*	870 25	873 50	1,743 75
790 25				790 25	Nanaimo	39 00	751 25	790 25
1,127 25				1,127 25	New Westminster	64 00	1,063 25	1,127 25
1,591 75				1,591 75	Vancouver	220 00	1,371 75	1,591 75
882 00		175 00		1,057 00	Victoria	248 00	809 00	1,057 00
4,391 25		175 00		4,566 25	*British Columbia*	571 00	3,995 25	4,566 25
29,054 05		26,087 50	5 00	55,146 55	Grand Totals	26,960 00	28,186 55	55,146 55

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

W. J. GERALD,
Deputy Minister.

GAS

DR. No. 22.—INSPECTION DISTRICTS in

Balances due by Inspectors, July 1, 1903.	Amounts received from Department to meet Expenditures.	Deductions from Salaries for Superannuation.	Deductions from Salaries for Retirement.	Deductions from Salaries for Guarantee.	Totals.	Districts.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	
	95 20	2 00		3 60	100 80	Barrie
	841 24	7 04		6 48	854 76	Belleville
	153 56			3 60	157 16	Berlin
	113 41				113 41	Brockville
	155 46	2 00		3 60	161 06	Cobourg
	124 40	2 00		3 60	130 00	Cornwall
	212 65	4 00		3 60	220 25	Guelph
	2,673 77	36 00		7 20	2,716 97	Hamilton
	167 11			0 34	167 45	Kingston
	187 40			3 60	191 00	Listowel
	1,473 95			3 60	1,477 55	London
	33 70				33 70	Napanee
	2,019 75			3 60	2,023 35	Ottawa
	317 40	4 00		3 60	325 00	Owen Sound
	165 45			3 60	169 05	Peterborough
	118 17			1 61	119 78	Sarnia
	211 95	4 00		3 60	219 55	Stratford
	3,453 65	34 04		7 31	3,495 00	Toronto
	12,518 22	95 08		62 54	12,675 84	*Ontario*
	3,157 23			5 40	3,162 63	Montreal
	1,471 48	25 96		3 60	1,501 04	Quebec
	143 40	3 00		3 60	150 00	Sherbrooke
	98 20			1 80	100 00	St. Hyacinthe
	4,870 31	28 96		14 40	4,913 67	*Quebec*
	196 40			3 60	200 00	Fredericton
	1,189 56			3 60	1,193 16	St. John
	1,385 96			7 20	1,393 16	*New Brunswick*
	2,766 97	27 00		7 20	2,801 17	Halifax
12 88					12 88	Pictou
12 88	2,766 97	27 00		7 20	2,814 05	*Nova Scotia*
	406 32			3 60	409 92	*Charlottetown, P.E.I.*
	441 65			3 60	445 25	*Winnipeg, Man.*
	96 40			3 60	100 00	Nanaimo
	91 40		5 00	3 60	100 00	New Westminster
	437 30	6 00		3 60	446 90	Vancouver
	193 80	4 00		3 60	201 40	Victoria
	818 90	10 00	5 00	14 40	848 30	*British Columbia*
200 00					200 00	General
	1,356 17				1,356 17	General expenses
	378 43				378 43	Printing
	157 24				157 24	Stationery
212 88	25,100 17	161 04	5 00	112 94	25,592 03	Grand Totals

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

SESSIONAL PAPER No. 12

INSPECTION.

Account with Expenditures, 1903–1904. Cr.

Expenditures authorized by the Department.						
Salaries.	Special Assistance.	Rent.	Travelling Expenses.	Sundries.	Balance due by Inspectors, June 30, 1904.	Totals.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
100 00				0 80		100 80
449 96	110 94	157 50	54 25	82 11		854 76
100 00			42 85	14 31		157 16
	99 96			13 45		113 41
100 00			30 60	30 46		161 06
100 00				30 00		130 00
200 00			6 00	14 25		220 25
2,499 96		18 00	123 80	75 21		2,716 97
38 70	15 00	22 50	25 55	65 70		167 45
100 00		73 50		17 50		191 00
1,100 00	24 00		258 90	94 65		1,477 55
			31 45	2 25		33 70
1,100 00	540 00	300 00	16 40	66 95		2,023 35
200 00		125 00				325 00
150 00			14 00	5 05		169 05
87 33		15 00	15 30	2 15		119 78
200 00			4 95	14 60		219 55
3,438 25			5 75	51 00		3,495 00
9,964 20	789 90	711 50	629 80	580 44		12,675 84
2,399 88	368 00	240 00	20 75	134 00		3,162 63
1,300 00		150 00		51 04		1,501 04
150 00						150 00
100 00						100 00
3,949 88	368 00	390 00	20 75	185 04		4,913 67
200 00						200 00
1,100 00			86 96	6 20		1,193 16
1,300 00			86 96	6 20		1,393 16
1,999 92		307 35	371 18	122 72		2,801 17
					12 88	12 88
1,999 92		307 35	371 18	122 72	12 88	2,814 05
357 49				52 43		409 92
300 00			119 25	26 00		445 25
100 00						100 00
100 00						100 00
300 00			82 00	64 90		446 90
200 00				1 40		201 40
700 00			82 00	66 30		848 30
					200 00	200 00
				1,356 17		1,356 17
				378 43		378 43
				157 24		157 24
18,571 49	1,157 90	1,408 85	1,309 94	2,930 97	212 88	25,592 03

W. J. GERALD,
Deputy Minister.

ELECTRIC LIGHT INSPECTION, 1903-1904.

DR. No. 23.—INSPECTION DISTRICTS IN ACCOUNT WITH REVENUE. CR.

Balances July 1, 1903. Stamps on hand.	Balances July 1, 1903. Cash on hand.	Stamps issued to Inspectors	Registration Fees accrued.	Totals.	Districts.	Deposited to the Credit of the Receiver General. Registration Fees.	Deposited to the Credit of the Receiver General. Inspection Fees.	Balances June 30, 1904. Stamps on hand.	Balances June 30, 1904. Cash on hand.	Totals.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1,639 00		500 00	542 50	2,681 50	Belleville	542 50	399 75	1,739 25		2,681 50
1,868 25		912 50	295 00	3,075 75	Hamilton	295 00	1,120 50	1,660 25		3,075 75
1,943 00		975 00	557 50	3,475 50	London	557 50	899 75	2,018 25		3,475 50
6,550 00		2,000 00	355 00	8,905 00	Ottawa	355 00	1,814 50	6,735 50		8,905 00
7,944 25		3,000 00	785 00	11,699 25	Toronto	785 00	3,380 25	7,335 50	198 50	11,699 25
19,944 50		7,387 50	2,535 00	29,837 00	*Ontario*	2,525 00	7,614 75	19,488 75	198 50	29,837 00
3,634 00		4,050 00	150 00	7,834 00	Montreal	150 00	3,259 50	1,424 50		7,834 00
1,997 50		1,250 00	165 00	3,412 50	Quebec	165 00	907 50	2,340 00		3,412 50
234 00			180 00	414 00	Sherbrooke	180 00	51 50	182 50		414 00
1,064 25			135 00	1,199 25	St. Hyacinthe	135 00	110 75	953 50		1,199 25
258 50			60 00	318 50	Three Rivers	60 00	68 25	190 25		318 50
7,188 25		5,300 00	690 00	13,178 25	*Quebec*	690 00	4,397 50	8,090 75		13,178 25
2,013 25		1,425 00	165 00	3,603 25	*St. John, N.B*	165 00	1,733 50	1,704 75		3,603 25
2,040 25		575 00	365 00	2,980 25	*Halifax, N.S.*	365 00	801 75	1,813 50		2,980 25
459 25		25 00	40 00	524 25	*Charlottetown, P.E.I.*	40 00	160 25	324 00		524 25
1,244 75		1,362 50	270 00	2,877 25	*Winnipeg, Man*	270 00	1,596 75	1,010 50		2,877 25
2,075 50		2,350 00	230 00	4,655 50	Vancouver	230 00	1,823 50	2,602 00		4,655 50
1,312 25		725 00	65 00	2,102 25	Victoria	65 00	695 75	1,341 50		2,102 25
3,387 75		3,075 00	295 00	6,757 75	*British Columbia*	295 00	2,519 25	3,943 50		6,757 75
			75 00	75 00	Dawson	75 00				75 00
36,248 00		19,150 00	4,435 00	59,833 00	Grand totals	4,435 00	18,823 75	36,375 75	198 50	59,833 00
			1 00	1 00	Less Refunds, as per Statement No. 16	1 00				1 00
36,248 00		19,150 00	4,434 00	59,832 00		4,434 00	18,823 75	36,375 75	198 50	59,832 00

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

W. J. GERALD,
Deputy Minister.

SESSIONAL PAPER No. 12

ELECTRIC LIGHT INSPECTION, 1903-1904.

DR. No. 24.—Inspection Districts in Account with Expenditures. CR.

Amount received from Department to meet expenditures.	Guarantee.	Totals.	Districts.	Expenditures Authorized by the Department.				
				Salaries.	Special Assistance.	Travelling Expenses.	Sundries.	Totals.
$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
304 51	.....	304 51	Belleville	.....	.....	294 01	10 50	304 51
112 80	.....	112 80	Hamilton.....	.....	.....	107 60	5 20	112 80
166 90	.....	166 90	London	.....	.....	165 50	1 40	166 90
93 80	.....	93 80	Ottawa.....	.....	.....	81 40	12 40	93 80
260 94	.....	260 94	Toronto	.....	.....	248 95	11 99	260 94
396 22	.....	396 22	Montreal.....	.....	364 00	20 65	11 57	396 22
41 06	.....	41 06	Quebec.	.....	.....	10 41	30 65	41 06
72 70	.....	72 70	Sherbrooke.....	.....	.....	67 95	4 75	72 70
343 90	1 80	345 70	St. Hyacinthe	300 00	.....	45 15	0 55	345 70
565 88	0 07	565 95	Three Rivers..	500 00	.....	61 25	4 70	565 95
183 37	.....	183 37	St. John.	.....	.....	174 83	8 54	183 37
200 65	.....	200 65	Halifax	.....	.....	197 90	2 75	200 65
34 81	.....	34 81	Charlottetown	.....	.....	14 45	20 36	34 81
11 65	.....	11 65	Winnipeg	.....	.....	.....	11 65	11 65
20 05	.....	20 05	Victoria.	.....	.....	9 45	10 60	20 05
3,393 52	.....	3,393 52	Chief Electrical Engineer	3,131 12	.....	91 11	171 29	3,393 52
1,679 01	.....	1,679 01	General.....	.....	.....	.....	1,679 01	1,679 01
123 62	.....	123 62	Printing..	.....	.....	.....	123 62	123 62
39 74	.....	39 74	Stationery..	.....	.....	.....	39 74	39 74
8,045 13	1 87	8,047 00	Totals.....	3,931 12	364 00	1,590 61	2,161 27	8,047 00

W. J. GERALD.
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

DR. No. 25.—STATEMENT showing the transactions in connection with the manufacture of Methylated Spirits, 1903-1904. CR.

	Amounts	Totals.		Amounts.	Totals
	$ cts.	$ cts.		$ cts	$ cts
To Stock on hand, July 1, 1903, viz.		7,759 70	By Goods sold as follows		68,325 69
Wood Naphtha, 2,712·51 Proof Galls. =1,614·61 Std. Galls. at $1.40	2,260 40		Methylated Spirits, 87,620·91 Proof Galls.		
Methylated Spirits, 4,268·79 Proof Galls.			12,317·25 Std. Galls. at $1.08	13,334 92	
2,088·96 Std. Galls. No. 1 at $1.10	2,297 86		31,205·68 " at $1.10	37,626 10	
189·26 " No. 2 at $1.50	733 89		6,598·31 " at $1.50	9,897 19	
Alcohol, 5,260·20 Proof Galls at 25c.	1,315 05		Drums, 199 at $10; 15 at $8	2,110 00	
Drums, 58 at $10	580 00		Barrels, 602 at $3; 1,399 at $2.50	5,303 50	
Barrels, 229 at $2.50	572 50		Cans, cartage and packing	5 05	
			1 damaged drum (sold)	2 00	
			1 can	6 90	
			2 Barrels Alcohol, 138·10 Proof Galls. (sold)	10 03	
To Stock sold in 1902-03 and not paid until after July 1, 1903		2,412 16	By Stock sold and not paid for, up to June 30, 1904		2,363 59
Methylated Spirits, 2,706·28 Proof Galls.			Methylated Spirits, 2,376·96 Proof Galls.		
633·06 Std. Galls. at $1.08	683 70		479·06 Std. Galls. at $1.08	517 36	
712·34 " at $1.10	783 57		703·20 " at $1.10	773 51	
288·83 " at $1.50	433 24		248·41 " at $1.50	372 60	
Drums, 8 at $10	80 00		Drums, 7 at $10	70 00	
Barrels, 75 at $2.50	187 50		Barrels, 16 at $2.50	40 00	
846·62 Proof Galls. Alcohol purchased at 25c. per gall. and not entered in warehouse until after June 30, 1903, and 13 barrels at $2.50	244 15		2,000·45 Proof Galls. Alcohol, purchased at 25c. per gall. and not entered in warehouse until after June 30, 1904, and 30 barrels at $3.00	590 12	
To Disbursements for purchases, &c.		13,232 55	By Goods used in manufacture—		
Alcohol, 61,750·78 Proof Galls. at 25c.	15,437 70		Wood Naphtha, 23,417·78 Proof Galls. =13,929·26 Std. Galls.		
" 1,042·83 " at 30c.	1,212 85		Alcohol, 66,052·35 Proof Galls.		
Wood Naphtha, 23,046·94 Proof Galls. =13,708·51 Std. Galls. at $1.40	19,191 92		Barrels destroyed, 74		
Drums, 202 at $10	2,020 00				
" 15 at $8	120 00		By Stock on hand, June 30, 1904		7,571 10
Barrels, 693 at $3	2,079 00		Wood Naphtha, 2,341·70 Proof Galls. =1,393·86 Std. Galls. at $1.40	1,951 40	
" 1,317 at $2.50	3,292 50		Methylated Spirits, 4,722·84 Proof Galls.		
Sundries	40 50		338· Std. Galls., special at $1.10	371 80	
	43,394 47		1,940·93 " No. 1, at $1.10	2,135 02	
Less freight and cartage	161 92		573·35 " No. 2, at $1.50	860 02	

To other expenses as follows		7,112 54
Rent of warehouse	800 00	
Salaries	4,813 73	
Retirement	91 66	
Freight	751 25	
Stationery, $12.94; printing, $30.31, lithographing, $40; Parliamentary Pubs., $3.84	87 09	
Sundries, including rent of motor power, heating, lighting, &c	838 78	
Manufactured during the year		
Methylated Spirits, 87,745·67 Proof Galls. 53,230·88 Std. Galls.		
Net profit		17,143 46
Total		78,260 38

Alcohol, 3,709·53 Proof Galls. at 30c.	1,112 86	
Drums, 63 at $10	630 00	
Barrels, 204 at $2.50	510 00	
Total		78,260 38

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

W. J. GERALD,
Deputy Minister.

No. 26—STATEMENT showing the Amounts voted, and the Expenditures authorized for each service for the Year ended June 30, 1904.

Services.	Grants.	Expenditures.	Over-Expenditures.	Under-Expenditures.
	$ cts.	$ cts.	$ cts.	$ cts.
Minister's salary	7,000 00	7,000 00		
Departmental salaries	37,460 00	*37,794 36	334 36	
" contingencies	7,400 00	6,438 22		961 78
Excise salaries	355,145 62	342,556 02		12,589 60
" contingencies	63,000 00	62,197 71		802 29
" " on account of stamps	42,000 00	42,000 00		
Commission to Customs officers	5,500 00	5,483 66		16 34
Duty pay	7,000 00	6,500 79		499 21
" other than special surveys	1,000 00	700 00		300 00
Preventive service	13,000 00	11,497 34		1,502 66
Minor Expenditure	1,000 00	33 41		966 59
Tobacco stamps commission	100 00	80 67		19 33
Weights and measures salaries	61,050 00	57,565 27		3,484 73
" " contingencies	33,500 00	27,203 55		6,296 45
Gas and electric light inspection salaries	22,750 00	22,502 61		247 39
" " contingencies	12,000 00	10,923 54		1,076 46
Adulteration of food	30,000 00	20,994 55		9,005 45
Methylated spirits	60,000 00	50,645 06		9,354 94
L. A. Fréchette, translation	100 00	100 00		
Provisional Allowance	500 00	99 96		400 04
E. F. Busby	500 00	500 00		
	760,005 62	712,816 72	334 36	47,523 26

* $1,103.65 should be charged to Consolidated Revenue, leaving a balance of $769.29 unexpended.

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

APPENDIX A

STATISTICS

APPENDIX A—SPIRITS.

No. 1.—RETURN of Manufactures for the year ended June 30, 1904.

DIVISIONS.	LICENSES.		GRAIN, &c., USED FOR DISTILLATION.						Total Grain used for Distillation.	Proof Spirits Manufactured.	Duty Collected ex-Manufactory, on Deficiencies and Assessments.		Total Duty Collected ex-Manufactory, including License Fees.
	No.	Fees.	Malt.	Indian Corn.	Rye.	Oats.	Wheat.	Molasses.					
		$	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Galls.	Galls.	$ cts.	$ cts.
Belleville, Ont....	1	250	174,000	3,375,600	1,009,200	34,800	.....	.....	4,593,600	273,427·26	.....	.....	250 00
Guelph " ...	1	250	460,540	6,240,000	1,302,000	67,060	.....	.....	8,069,600	468,350·06	402·15	764 09	1,014 09
Hamilton "	1	250	205,190	3,441,165	711,965	22,005	514,075	.....	4,894,400	291,883·97	.....	.....	500 00
Perth "	2	500	366,951	.....	.....	.....	.....	.....	366,951	19,784·60	0·78	1 50	251 50
Prescott "	1	250	365,730	7,479,450	1,394,496	91,408	.....	.....	9,331,084	534,622·09	.....	.....	250 00
Toronto "	1	250	1,272,481	20,928,035	4,576,255	266,880	.....	.....	27,043,651	1,632,184·44	3,087·91	5,867 03	6,117 03
Windsor "	1	250	1,865,359	23,832,000	5,242,780	198,600	.....	.....	31,138,739	1,783,585·63	2·21	530 47	780 47
Totals.....	8	2,000	4,710,251	65,296,250	14,236,696	680,753	514,075	.....	85,438,025	5,003,838·05	3,493·05	7,163 09	9,163 09
Joliette, Que.....	1	250	1,372,520	1,112,330	1,346,050	.....	33,100	.....	3,864,000	196,205·03	.....	.....	250 00
Montreal "	2	375	.....	.....	.....	.....	.....	7,993,675	.....	422,687·47	2,964·72	5,632 97	6,007 97
St. Hyacinthe, Que.	1	125	47,237	831,709	152,508	9,461	.....	.....	1,040,915	55,423·32	.....	.....	125 00
Totals.....	4	750	1,419,757	1,944,039	1,498,558	9,461	33,100	7,993,675	4,904,915	674,315·82	2,964·72	5,632 97	6,382 97
Grand Totals..	12	2,750	6,130,008	67,240,289	15,735,254	690,214	547,175	7,993,675	90,342,940	5,678,153·87	6,457·77	12,796 06	15,546 06

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

W. J. GERALD,
Deputy Minister.

APPENDIX A—*Continued*—SPIRITS.

No. 2.—Comparative Statement of Manufactures for the years ended June 30, 1903 and 1904.

Provinces.	Licenses.		Grain, &c., used for Distillation.						Total Grain used for Distillation.	Proof Spirits Manufactured.	Duty Collected ex-Manufactory, on Deficiencies and Assessments.		Total Duty Collected ex-Manufactory, including License Fees.
	No.	Fees.	Malt.	Indian Corn.	Rye.	Oats.	Wheat.	Molasses.					
1903.		$	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Galls.	Galls.	$ cts.	$ cts.
Ontario	8	2,000	3,189,591	48,418,792	10,715,607	475,602	2,036,962	.....	61,836,554	3,801,514·63	1,019·09	2,051 67	4,051 67
Quebec	2	500	1,245,725	1,097,120	1,319,410	.....	.....	1,514,687	3,662,255	262,088·58	.....	.....	500 00
Totals	10	2,500	4,435,316	49,515,912	12,035,017	475,602	2,036,962	1,514,687	68,498,809	4,063,603·21	1,019·09	2,051 67	4,551 67
1904.													
Ontario	8	2,000	4,710,251	65,296,250	14,236,696	680,753	514,075	.....	85,438,025	5,003,838·05	3,493·05	7,163 09	9,163 09
Quebec	4	750	1,419,757	1,944,039	1,498,558	9,461	33,100	7,993,675	4,904,915	674,315·82	2,964·72	5,632 97	6,382 97
Totals	12	2,750	6,130,008	67,240,289	15,735,254	690,214	547,175	7,993,675	90,342,940	5,678,153·87	6,457·77	12,796 06	15,546 06

Inland Revenue Department,
Ottawa, August 19, 1904.

W. J. GERALD,
Deputy Minister.

APPENDIX A—*Continued*—SPIRITS.

No. 3.—STATEMENT showing the transactions in the Distilleries in the

DIVISIONS.	In Process, including Deficiencies, brought forward.	Manufactured during the year, including surpluses.	RETURNED TO DISTILLERY FOR REDISTILLATION.		Received from other sources, Duty paid.
			Duty Paid.	In Bond.	
	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.
Belleville, Ont.	1,853 97	273,427 26		123 69	1,726 45
Guelph "	21,164 03	468,350 06		67 35	2,018 30
Hamilton "	654 60	291,883 97		32,019 75	325 86
Perth "	101 04	19,784 60			
Prescott "	23,572 57	534,622 09		1,333 15	697 31
Toronto "	9,209 36	1,632,184 44	848 46	573,172 08	2,337 09
Windsor "	52,707 19	1,783,585 63		142,106 54	141 94
Totals	109,262 76	5,003,838 05	848 46	748,822 56	7,246 95
Joliette, Que.	2,867 62	196,205 03			
Montreal "	5,472 12	422,687 47			
St. Hyacinthe, Que.		55,423 32			
Totals	8,339 74	674,315 82			
Grand Totals	117,602 50	5,678,153 87	848 46	748,822 56	7,246 95

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

Dominion of Canada during the year ended June 30, 1904.

Totals.	Warehoused during the year.	Fusel Oil written off.	Written off.	Deficiencies on which duty was collected.	In Process, including Deficiencies carried forward.	Totals.
Gallons.	Gallons	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.
277,131·37	273,502·45	1,853·97	.....	.....	1,774·95	277,131·37
491,599·74	475,257·77	1,363·50	.....	402·15	14,576·32	491,599·74
324,884·18	323,649·17	208·86	.....	.....	1,026·15	324,884·18
19,885·64	19,390·05	.....	.....	·78	494·81	19,885·64
560,225·12	534,064·09	810·58	.....	.....	25,350·45	560,225·12
2,217,751·43	2,188,971·98	3,070·91	9,085·49	3,087·91	13,535·14	2,217,751·43
1,978,541·30	1,866,548·88	5,111·69	.....	2·21	106,878·52	1,978,541·30
5,870,018·78	5,681,384·39	12,419·51	9,085·49	3,493·05	163,636·34	5,870,018·78
199,072·65	191,558·08	.....	.....	.....	7,514·57	199,072·65
428,159·59	397,007·97	2,478·95	.....	2,964·72	25,707·95	428,159·59
55,423·32	53,488·27	.....	.....	.....	1,935·05	55,423·32
682,655·56	642,054·32	2,478·95	.....	2,964·72	35,157·57	682,655·56
6,552,674·34	6,323,438·71	14,898·46	9,085·49	6,457·77	198,793·91	6,552,674·34

W. J. GERALD,
Deputy Minister.

APPENDIX A—*Continued*—SPIRITS.

DR. No. 4.—WAREHOUSE RETURN

Remaining in Warehouse from last year.	Warehoused	Imported.	Received from other Divisions.	Totals.	DIVISIONS.	Entered for Consumption.	
Galls.	Galls.	Galls.	Galls.	Galls.		Galls.	$ cts.
579,396·60	273,502·45	.....	32,901·50	885,800·55	Belleville, Ont.	64,799·27	123,118 48
7,011·13	.....	.....	24,111·27	31,122·40	Brantford "	16,955·29	32,215 13
724·76	.....	.....	4,485·71	5,210·47	Cornwall "	4,702·73	8,935 38
824,555·07	475,257·77	.....	98,632·10	1,398,444·94	Guelph "	282,226·39	536,230 73
525,321·35	323,649·17 *2·91	.....	116,891·32	965,864·75	Hamilton "	137,457·25	261,175 42
3,086·44	.....	.....	51,111·49	54,197·93	Kingston "	41,177·35	78,248 85
6,428·04	.....	.....	36,201·48	42,629·52	London "	37,368·15	71,001 25
24,102·88	.....	.....	148,550·02	172,652·90	Ottawa "	148,972·98	283,147 12
6,106·82	.....	.....	65,793·62	71,900·44	" Gvt. Wse. "	.....	.....
.....	.....	.....	106·03	106·03	" Dep. Lab. "	.....	.....
1,133·33	.....	.....	13,717·50	14,850·83	Owen Sound "	13,452·18	25,561 63
67,379·80	19,390·05	.....	37,486·99	124,256·84	Perth "	46,873·56	89,293 39
6,165·05	.....	.....	26,910·64	33,075 69	Peterboro' "	25,271·44	48,019 58
3,629·81	.....	.....	18,797·23	22,427·04	Port Arthur "	18,494·75	35,152 13
742,417·44	534,064·09	189,260·32	27,624·05	1,493,365·90	Prescott "	25,413·86	105,064 45
802·69	.....	.....	7,748·32	8,551·01	St. Cath'ines "	7,463·55	14,181 58
2,625·56	.....	.....	17,581·78	20,207·34	Stratford "	18,626·81	35,398 26
2,830,536·49	2,188,971·98	.....	221,712·40	5,241,220·87	Toronto "	435,477·47	820,111 71
4,421,482·62	1,866,548·88	10,517·57	48,046·47	6,346,595·54	Windsor "	204,980·52	390,548 82
10,052,905·88	5,681,384·39 *2·91	199,777·89	998,409·92	16,932,480·99	..Totals.....	1,529,713·55	2,957,403 91
352,102·21	191,558·08	.....	24,708·01	568,368·30	Joliette, Que.	32,857·03	62,562 10
165,802·64	397,007·97	.....	985,920·16	1,548,730·77	Montreal "	872,729·77	1,641,796 77
31,678·65	.....	.....	269,357·82	301,036·47	Quebec "	270,667·80	514,449 14
15,017·56	53,488·27	.....	105,301·36	173,807·19	St. Hya'nthe "	80,669·21	153,372 65
5,720·85	.....	25,548·28	79,526·80	110,795·93	Sherbrooke "	80,422·46	160,496 93
6,512·51	.....	.....	35,585·45	42,097·96	Three Rivers "	37,274·35	70,847 35
576,834·42	642,054·32	25,548·28	1,500,399·60	2,744,836·62	..Totals.....	1,374,620·62	2,603,524 94
10,728·23	.....	.....	94,938·83	105,667·06	St. John, N.B.	77,947·49	148,114 57
5,097·70	.....	.....	41,586·31	46,684·01	Halifax, N.S..	33,203·65	63,098 09
193·40	.....	.....	4,758·58	4,951·98	Pictou " ..	4,619·71	8,777 45
5,291·10	.....	.....	46,344·89	51,635·99	..Totals.....	37,823·36	71,875 54
68·02	.....	.....	.....	68·02	Charlot'n, P.E.I	68·02	129 26
46,957·22	.....	.....	274,043·67	321,000·89	Winnipeg, Mn.	272,632·03	517,380 34
9,636·49	.....	.....	35,342·56	44,979·05	Calgary, N.W.T	30,975·65	58,864 54
40,601·03	.....	.....	98,147·68	138,748·71	Vancouver, B.C	91,188·14	173,281 06
27,574·11	.....	.....	70,157·08	97,731·19	Victoria "	57,264·05	108,824 88
68,175·14	.....	.....	168,304·76	236,479·90	..Totals.....	148,452·19	282,105 94
5,878·61	.....	.....	8,694·67	14,573·28	Dawson, Y.T..	9,054·45	17,203 85
8,612·54	.....	.....	.....	8,612·54	Sundries. ..	.....	.....
10,785,087·65	6,323,438·71 *2·91	225,326·17	3,126,478·90	20,460,334·34	Grand Totals..	3,481,287·36	6,656,602 89

* Surplus. This amount includes 867,597.85 collected on imported spirits used in bonded factories, at 30c. per gallon.

DEPARTMENT OF INLAND REVENUE,
OTTAWA, August 19, 1904.

for the year ended June 30, 1904. CR.

Removed in Bond.		Free.		Exported.	Used in Bonded Factories.	Remaining in Warehouse.	Totals.
To other Divisions.	To Distillery for Re-distillation.	Legal Allowance.	Other.				
Galls.	Galls.	Galls.	Galls.	Galls.	Galls.	Galls.	Galls.
190,254·93	123·69	5,391·20	1,485·14	151·01	....	623,595·31	885,800·55
141·50	....	....	....	....	9,629·33	4,396·28	31,122·40
....	....	....	....	....	....	507·74	5,210·47
113,276·88	67·35	26,759·27	1,986·11	17,769·80	....	956,359·14	1,398,444·94
195,364·88	32,019·75	9,478·44	178·95	379·03	20,532·91	570,462·54	965,864·75
....	....	....	....	15·24	8,162·34	4,843·00	54,197·93
102·42	....	....	....	20·66	....	5,138·29	42,629·52
....	....	....	260·40	....	200·64	23,218·88	172,652·90
....	....	....	138·10	....	‡66,052·35	5,709·99	71,900·44
....	....	....	106·03	....	....	....	106·03
....	....	....	....	....	....	1,398·65	14,850·83
2,995·28	....	583·38	....	....	....	73,804·62	124,256·84
....	....	....	....	....	....	7,804·25	33,075·69
....	....	....	....	....	....	3,932·29	22,427·04
316,424·19	1,333·15	4,317·51	617·89	1,746·33	189,260·32	954,252·65	1,493,365·90
149·53	....	....	....	45·00	....	892·93	8,551·01
....	....	....	....	....	....	1,580·53	20,207·34
1,096,403·18	573,172·08	12,871·95	4,105·43	3,944·22	62,824·20	3,052,922·34	5,241,220·87
984,494·04	142,106·54	57,842·71	842·93	153,300·25	10,517·57	4,792,510·98	6,346,595·54
2,899,606·83	748,822·56	116,744·46	9,720·98	177,362·54	301,127·31 ‡66,052·35	11,083,330·41	16,932,480·99
136,359·87	....	660·75	....	....	....	398,490·65	568,368·30
62,391·50	....	119·58	....	175·20	48,941·63	564,373·09	1,548,730·77
....	....	....	480·15	....	....	29,888·52	301,036·47
3,829·84	....	....	....	....	22,471·09	66,837·05	173,807·19
....	....	....	....	....	25,548·28	4,825·19	110,795·93
....	....	....	....	....	....	4,823·61	42,097·96
202,581·21	....	780·33	480·15	175·20	96,961·00	1,069,238·11	2,744,836·62
1,207·69	....	....	....	....	7,574·65	18,937·23	105,667·06
4,758·58	....	....	....	192·67	....	8,529·11	46,684·01
....	....	....	....	....	....	332·27	4,951·98
4,758·58	....	....	....	192·67	....	8,861·38	51,635·99
....	....	....	....	....	....	....	68·02
1,137·29	....	....	....	18·13	....	47,213·44	321,000·89
599·08	....	....	....	....	....	13,404·32	44,979·05
2,533·72	....	....	....	155·26	....	44,871·59	138,748·71
14,054·50	....	....	72·60	2,387·06	....	23,952·98	97,731·19
16,588·22	....	....	72·60	2,542·32	....	68,824·57	236,479·90
....	....	....	....	....	....	5,518·83	14,573·28
....	....	....	....	....	....	8,612·54	8,612·54
3,126,478·90	748,822·56	117,524·79	10,273·73	180,290·86	405,662·96 ‡66,052·35	12,323,940·83	20,460,334·34

‡ Used in the manufacture of methylated spirits at the Government warehouse, Ottawa.

W. J. GERALD,
Deputy Minister.

APPENDIX A—*Continued*—SPIRITS..

DR. No. 5.—COMPARATIVE STATEMENT of Warehouse

Remaining in Warehouse from last year.	Warehoused.	Imported.	Received from other Divisions.	Totals.	PROVINCES.	Entered for Consumption.	
Galls.	Galls.	Galls.	Galls.	Galls.	1903.	Galls.	$ cts.
10,038,804·52	*5·96 4,696,883·13	171,228·55	856,159·46	15,763,081·62	Ontario.....	1,435,682·49	2,773,236 52
399,258·52	256,692·08	†115·54 57,251·21	1,410,124·96	2,123,442·31	Quebec.....	1,256,729·28	2,406,132 01
13,219·94	.....	.....	82,078·04	95,297·98	New Brunswick.	76,605·79	145,555 83
6,076·97	.....	.....	31,372·95	37,449·92	Nova Scotia	31,362·62	59,594 56
409·67	.....	.....	166·73	576·40	P. E. Island....	508·38	965 84
34,716·97	.....	.....	246,348·02	281,064·99	Manitoba.	232,003·75	440,515 74
8,040·61	.....	.....	26,631·55	34,672·16	N. W. Territory	25,035·67	47,574 44
54,268·12	.....	.....	177,213·86	231,481·98	B. Columbia....	145,371·30	276,247 65
.....	.....	.....	10,327·45	10,327·45	Yukon Territory	4,448·84	8,452 63
8,612·54	.....	.....	.....	8,612·54	Sundries.....	.....	.....
10,563,407·86	4,953,575·21 *5·96	†115·54 228,479·76	2,840,423·02	18,586,007·35	....Totals.....	3,207,748·12	6,158,275 22
					1904.		
10,052,905·88	*2·91 5,681,384·39	199,777·89	998,409·92	16,932,480·99	Ontario.....	1,529,713·55	2,957,403 91
576,834·42	642,054·32	25,548·28	1,500,399·60	2,744,836·62	Quebec.....	1,374,620·62	2,603,524 94
10,728·23	.....	.....	94,938·83	105,667·06	New Brunswick.	77,947·49	148,114 57
5,291·10	.....	.....	46,344·89	51,635·99	Nova Scotia	37,823·36	71,875 54
68·02	.....	.....	.....	68·02	P. E. Island....	68·02	129 26
46,957·22	.....	.....	274,043·67	321,000·89	Manitoba.....	272,632·03	517,380 34
9,636·49	.....	.....	35,342·56	44,979·05	N. W. Territory	30,975·65	58,864 54
68,175·14	.....	.....	168,304·76	236,479·90	B. Columbia....	148,452·19	282,105 94
5,878·61	.....	.....	8,694·67	14,573·28	Yukon Territory	9,054·45	17,203 85
8,612·54	.....	.....	.....	8,612·54	Sundries.....	.....	.....
10,785,087·65	*2·91 6,323,438·71	225,326·17	3,126,478·90	20,460,334·34	....Totals.....	3,481,287·36	6,656,602 89

* Surplus. † Seizure.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

Returns for the Years ended June 30, 1903 and 1904. CR.

Removed in Bond.		Free.		Exported.	Used in Bonded Factories.	Remaining in Warehouse.	Totals.
To other Divisions.	To Distillery for Re-distillation.	Legal Allowance.	Other.				
Galls.	Galls.	Galls.	Galls.	Galls.	Galls.	Galls.	Galls.
2,671,741·29	870,230·91	229,519·86	7,556·57	154,193·81	†68,444·23 272,806·58	10,052,505·88	15,763,081·62
149,677·51	. . . . .	130·31	393·86	712·69	138,964·24	576,834·42	2,123,442·31
1,094·70	. . . . .	. . . .	. . . . .	9·49	6,859·77	10,728·23	95,297·98
682·66	. . . . .	. . . .	. . . .	113·54	. . . . .	5,291·10	37,449·92
. . . . .	. . . . .	. . . .	. . . .	. . . . .	. . . . .	68·02	576·40
1,987·36	. . . . .	. . . .	. . . . .	116·66	. . . . .	46,957·22	281,064·99
. . . . .	. . . . .	. . . .	. . . . .	. . . . .	. . . . .	9,636·49	34,672·16
15,239·50	. . . . .	. . . .	175·86	2,520·18	. . . . .	68,175·14	231,481·98
. . . . .	. . . . .	. . . .	. . . . .	. . . . .	. . . . .	5,878·61	10,327·45
. . . . .	. . . . .	. . . .	. . . . .	. . . . .	. . . . .	8,612·54	8,612·54
2,840,423·02	870,230·91	229,650·17	8,126·29	157,666·37	418,630·59 †68,444·23	10,785,087·65	18,586,007·35
2,899,606·83	748,822·56	116,744·46	9,720·98	177,362·54	†66,052·35 301,127·31	11,083,330·41	16,932,480·99
262,581·21	. . . . .	780·33	480·15	175·20	96,961·00	1,069,238·11	2,744,886·62
1,207·69	. . . . .	. . . .	. . . .	. . . .	7,574·65	18,937·23	105,667·06
4,758·58	. . . . .	. . . .	. . . .	192·67	. . . . .	8,861·38	51,635·99
. . . . .	. . . . .	. . . .	. . . .	. . . .	. . . . .	. . . . .	68·02
1,137·29	. . . . .	. . . .	. . . .	18·13	. . . . .	47,243·44	321,000·89
599·08	. . . . .	. . . .	. . . .	. . . .	. . . . .	13,404·32	44,979·05
16,588·22	. . . . .	. . . .	72·60	2,542·32	. . . . .	68,824·57	236,479·90
. . . . .	. . . . .	. . . .	. . . .	. . . .	. . . . .	5,518·83	14,573·28
. . . . .	. . . . .	. . . .	. . . .	. . . .	. . . . .	8,612·54	8,612·54
3,126,478·90	748,822·56	117,524·79	10,273·73	180,290·86	†66,052·35 405,662·96	12,323,940·83	20,460,334·34

† Used in the manufacture of methylated spirits at the Government warehouse, Ottawa.

	1903.	1904.
Total duty collected ex-manufactory and ex-warehouse	$ 6,160,326 89	$ 6,669,398 95
" " on licenses	2,500 00	2,750 00
Totals	$ 6,162,826 89	$ 6,672,148 95

W. J. GERALD,
Deputy Minister.

APPENDIX A—*Continued.*—MALT.

No. 6.—RETURN of Manufactures for the Year ended June, 30, 1904.

DIVISIONS.	LICENSES.		Grain Placed in Steep.	Malt Manufactured.	Warehoused.	Total Duty collected ex-manufactory, including License Fees.
	No.	Fees.				
		$	Lbs.	Lbs.	Lbs.	$ cts.
Belleville, Ont	1	50	313,423	248,606	248,606	50 00
Brantford "	2	100	584,949	467,535	467,535	100 00
Guelph "	7	750	8,374,266	6,716,690	6,716,690	750 00
Hamilton "	3	500	7,583,254	6,126,998	6,126,998	500 00
Kingston "	2	250	6,565,249	5,241,500	5,241,500	250 00
London "	3	450	5,710,658	4,530,941	4,530,941	450 00
Ottawa "	1	100	710,243	562,833	562,833	100 00
Owen Sound "	1	200	2,701,574	2,127,890	2,127,890	200 00
Perth "	2	100	437,969	357,481	357,481	100 00
Peterborough, Ont	2	150	795,705	618,844	618,844	150 00
Prescott "	3	200	1,914,720	1,509,241	1,509,241	200 00
St. Catharines "	2	100	924,524	741,516	741,516	100 00
Stratford "	1	200	7,365,300	5,835,160	5,835,160	200 00
Toronto "	10	1,400	19,711,491	15,630,447	15,630,447	1,400 00
Windsor "	1	200	3,876,000	3,117,800	3,117,800	200 00
Totals	41	4,750	67,560,325	53,833,482	53,833,482	4,750 00
Montreal, Que	3	600	12,352,951	9,879,148	9,879,148	600 00
Quebec "	1	150	1,467,293	1,177,930	1,177,930	150 00
Totals	4	750	13,820,244	11,057,078	11,057,078	750 00
Halifax, N.S.	1	150	617,259	489,979	489,979	150 00
Winnipeg, Man	1	150	1,779,210	1,406,170	1,406,170	150 00
Calgary, N.W.T	3	300	2,119,808	1,717,219	1,717,219	300 00
Grand Totals	50	6,100	85,905,846	68,503,928	68,503,928	6,100 00

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

W. J. GERALD,
Deputy Minister.

SESSIONAL PAPER No. 12

APPENDIX A—*Continued.*—MALT.

No. 7.—COMPARATIVE Statement of Manufactures for the Years ended June 30, 1903 and 1904.

PROVINCES.	LICENSES.		Grain Placed in Steep.	Malt Manufactured.	Warehoused.	Total Duty collected ex-Manufactory, including License Fees.
	No.	Fees.				
1903.		$	Lbs.	Lbs.	Lbs.	$ cts.
Ontario	43	5,125	66,149,355	52,194,736	52,194,736	5,125 00
Quebec	4	750	13,467,618	10,777,201	10,777,201	750 00
Nova Scotia	1	150	777,827	615,570	615,570	150 00
Manitoba	2	200	1,861,846	1,508,445	1,508,445	200 00
N. W. Territories	3	275	1,743,921	1,396,208	1,396,208	275 00
Totals	53	6,500	84,000,567	66,492,160	66,492,160	6,500 00
1904.						
Ontario	41	4,750	67,569,325	53,833,482	53,833,482	4,750 00
Quebec	4	750	13,820,244	11,057,078	11,057,078	750 00
Nova Scotia	1	150	617,259	489,979	489,979	150 00
Manitoba	1	150	1,779,210	1,406,170	1,406,170	150 00
N. W. Territories	3	300	2,119,808	1,717,219	1,717,219	300 00
Totals	50	6,100	85,905,846	68,503,928	68,503,928	6,100 00

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

W. J. GERALD,
Deputy Minister.

APPENDIX A—*Continued*—MALT.

DR. No. 8—WAREHOUSE RETURN for

Remaining in Warehouse from last year.	Warehoused	Increases.	Received from other Divisions.	Imported.	Totals.	DIVISIONS.
Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	
32,142	248,606	1,578	67,630	.....	349,956	....Belleville, Ont.....
237,992	467,535	9,820	220,000	.....	935,347	....Brantford " .....
3,474,841	6,716,690	82,880	850,160	.....	11,124,571	...Guelph " .....
2,019,464	6,126,998	56,726	131,000	.....	8,334,188	....Hamilton " .....
3,069,862	5,241,500	61,970	180	.....	8,373,512	....Kingston " .....
2,488,679	4,530,941	46,862	281,222	.....	7,347,704	... London " .....
99,434	562,833	7,514	79,175	.....	748,956	... Ottawa " .....
1,522,376	2,127,890	16,381	639,800	.....	4,306,447	....Owen Sound " .....
9,028	357,481	129	35,000	.....	401,638	....Perth " .....
688,610	618,844	34,011	320,000	.....	1,661,465	....Peterborough " .....
49,227	.....	.....	80,000	.....	129,227	....Port Arthur " .....
687,694	1,509,241	13,966	.....	.....	2,210,901	...Prescott " .....
91,448	741,516	4,384	407,200	.....	1,244,548	....St. Catharines " .....
2,383,142	5,835,160	36,810	348,880	.....	8,603,992	....Stratford " .....
6,549,994	15,630,447	97,484	1,659,200	129,460	24,066,585	... Toronto " .....
1,109,040	3,117,890	10,660	481,400	1,680	4,720,580	....Windsor " .....
24,512,973	53,833,482	481,175	5,600,847	131,140	84,559,617	....Totals.....
33,555	.....	19,540	1,348,410	.....	1,401,505	... Joliette, Que.....
5,241,671	9,879,148	108,314	2,637,440	10,000	17,876,573	....Montreal " .....
137,072	1,177,930	.....	2,606,476	.....	3,921,478	....Quebec " .....
.....	.....	.....	57,000	3,500	60,500	... St. Hyacinthe " .....
80,600	.....	.....	1,360,000	.....	1,440,600	.. .Sherbrooke " .....
5,492,898	11,057,078	127,854	8,009,326	13,500	24,700,656	..... Totals.....
62,096	.....	.....	1,400,000	.....	1,462,096	....St. John, N.B.....
.....	.....	.....	40,000	.....	40,000	....Pictou, N.S .....
192,034	489,979	2,490	2,531,400	.....	3,215,903	...Halifax " .....
192,034	489,979	2,490	2,571,400	.....	3,255,903	.. ..Totals.....
541,381	1,406,170	10,734	1,523,710	162,539	3,644,534	....Winnipeg, Man.....
490,434	1,717,219	1,339	80,000	210,063	2,499,055	....Calgary, N.W.T.....
122,384	.....	.....	315,866	2,365,873	2,804,123	... Vancouver, B.C.....
40,010	.....	.....	288,100	1,215,104	1,543,214	....Victoria " .....
162,394	.....	.....	603,966	3,580,977	4,347,337	....Totals.....
.....	.....	.....	.....	59,999	59,999	....Dawson, Yukon Ter.....
31,454,210	68,503,928	623,592	19,789,249	4,158,218	124,529,197	....Grand Totals.....

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

the Year ended June 30, 1904. CR.

Entered for Consumption at 1½ cents per lb.		Removed to other Divisions.	Exported.	Free, and Written off.	Remaining in Warehouse.	Totals.
Lbs.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
346,130	5,191 95	180			3,646	349,956
744,481	11,167 19				190,866	935,347
5,542,909	83,143 64	2,600,398	36,000		2,945,264	11,124,571
5,282,120	79,231 80	1,260,000			1,792,068	8,334,188
2,899,572	43,493 58	4,004,540			1,469,400	8,373,512
4,725,762	70,887 20	40,000			2,581,942	7,347,704
533,386	8,000 79				215,570	748,956
1,395,114	20,926 71	2,206,560	80,000		624,773	4,306,447
13	0 20			375,966	25,659	401,638
978,544	14,678 16	320,000	36,000	1,000	325,921	1,661,465
114,553	1,718 30				14,674	129,227
1,416,162	21,242 45	242,547			552,192	2,210,901
1,115,512	16,732 68				129,036	1,244,548
3,489,594	52,343 91	4,048,082			1,066,316	8,603,992
13,818,870	207,283 05	1,573,090		720	8,673,905	24,066,585
3,002,780	45,041 70	216,000		503,100	998,700	4,720,580
45,405,502	681,083 31	16,511,397	152,000	880,786	21,609,932	84,559,617
				1,372,520	28,985	1,401,505
11,251,652	168,774 78	2,853,886	196,000		3,575,035	17,876,573
3,809,478	57,141 99				112,000	3,921,478
60,500	907 50					60,500
1,385,630	20,784 45				54,970	1,440,600
16,507,260	247,608 72	2,853,886	196,000	1,372,520	3,770,990	24,700,656
1,385,162	20,777 43				76,934	1,462,096
		40,000				40,000
2,981,744	44,726 16		28,936		205,223	3,215,903
2,981,744	44,726 16	40,000	28,936		205,223	3,255,903
3,335,742	50,036 12				308,792	3,644,534
1,653,098	24,796 46	383,966			461,991	2,499,055
2,566,620	38,499 46				237,503	2,804,123
1,540,864	23,112 77				2,359	1,543,214
4,107,484	61,612 23				239,853	4,347,337
54,355	815 35				5,644	59,999
75,430,347	1,131,455 78	19,789,249	376,936	2,253,306	26,679,359	124,529,197

W. J. GERALD,
Deputy Minister.

APPENDIX A—*Continued*—MALT.

DR. No. 9—COMPARATIVE STATEMENT of Warehouse Returns

Remaining in Warehouse from last year.	Warehoused	Increases.	Received from other Divisions.	Imported.	Totals.	PROVINCES.
Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	1903.
24,411,407	52,194,736	570,778	6,834,852	341,750	84,353,523	Ontario
4,339,971	10,777,201	129,942	8,659,337	8,160	23,914,611	Quebec
80,266			1,432,000		1,512,266	New Brunswick
93,217	615,570	3,359	2,292,000		3,004,146	Nova Scotia
12,960			117,000		129,960	Prince Edward Island
493,801	1,508,445	25,513	1,020,000		3,047,759	Manitoba
576,258	1,396,208	10,000		48,459	2,030,925	N. W. Territories
249,049			428,010	3,197,747	3,874,806	British Columbia
30,256,929	66,492,160	739,592	20,783,199	3,596,116	121,867,996	Totals
						1904.
24,512,973	53,833,482	481,175	5,600,847	131,140	84,559,617	Ontario
5,492,898	11,057,078	127,854	8,009,326	13,500	24,700,656	Quebec
62,096			1,400,000		1,462,096	New Brunswick
192,034	489,979	2,490	2,571,400		3,255,903	Nova Scotia
541,381	1,406,170	10,734	1,523,710	162,539	3,644,534	Manitoba
490,434	1,717,219	1,339	80,000	210,063	2,499,055	N. W. Territories
162,394			603,966	3,586,977	4,347,337	British Columbia
				59,999	59,999	Yukon Territory
31,454,210	68,503,928	623,592	19,789,249	4,158,218	124,529,197	Totals

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

for the Years ended June 30, 1903 and 1904. CR.

Entered for Consumption t 1½ cents per lb.		Removed to other Divisions.	Exported.	Free, and Written off.	Remaining in Warehouse.	Totals.
Lbs.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
41,347,837	620,218 40	17,887,614	192,000	413,099	24,512,973	84,353,523
14,735,367	221,030 38	2,321,575	42,480	1,322,291	5,492,898	23,914,611
1,370,170	20,552 55	80,000			62,096	1,512,266
2,705,552	40,583 28	54,000	52,560		192,034	3,004,146
93,960	1,409 40	36,000				129,960
2,506,378	37,595 67				541,381	3,047,759
1,144,481	17,167 28	396,010			490,434	2,030,925
3,704,412	55,566 04	8,000			162,394	3,874,806
67,608,157	1,014,123 00	20,783,199	287,040	1,735,390	31,454,210	121,867,996
45,405,502	681,083 31	16,511,397	152,000	880,786	21,609,932	84,559,617
16,507,260	247,608 72	2,853,886	196,000	1,372,520	3,770,990	24,700,656
1,385,162	20,777 43				76,934	1,462,096
2,981,744	44,726 16	40,000	28,936		205,223	3,255,903
3,335,742	50,036 12				308,792	3,644,534
1,653,098	24,796 46	383,966			461,991	2,499,055
4,107,484	61,612 23				239,853	4,347,337
54,355	815 35				5,644	59,999
75,430,347	1,131,455 78	19,789,249	376,936	2,253,306	26,679,359	124,529,197

	1903.	1904.
Total duty collected, ex-manufactory and ex-warehouse	$ 1,014,123 00	$ 1,131,455 78
" " on licenses	6,500 00	6,100 00
	$ 1,020,623 00	$ 1,137,555 78

W. J. GERALD,
Deputy Minister.

APPENDIX A.—*Continued*—MALT LIQUOR.

No. 10.—RETURN of Manufactures for the Year ended June 30, 1904.

Divisions.	Licenses. No.	Licenses. Fees.	Malt used.	Other commodities used.	Malt Liquor manufactured.	Malt Liquor exported, and used by H. M. Army and Navy.	Total Duty collected, including License Fees.
		$	Lbs.	Lbs.	Galls.	Galls.	$ cts.
Belleville, Ont.	1	50	180,756	.....	82,874	.....	50 00
Brantford, "	4	200	713,054	.....	295,136	.....	200 00
Guelph, "	8	400	4,695,860	.....	2,056,632	.....	400 00
Hamilton, "	3	150	3,237,282	.....	1,562,159	.....	150 00
Kingston, "	2	100	484,056	.....	152,275	.....	100 00
London, "	6	300	5,170,801	.....	2,009,616	1,388	300 00
Ottawa, "	4	175	983,108	.....	374,360	.....	175 00
Owen Sound "	6	300	1,197,151	.....	486,990	.....	300 00
Peterborough, "	3	150	979,797	.....	327,080	.....	150 00
Port Arthur, "	1	50	109,553	.....	45,222	.....	50 00
Prescott, "	2	100	1,034,200	.....	351,880	.....	100 00
St. Catharines "	2	100	1,111,660	.....	424,550	.....	100 00
Stratford, "	5	225	472,050	.....	217,800	.....	225 00
Toronto, "	14	700	12,553,906	.....	5,270,493	.....	700 00
Windsor "	3	150	1,596,399	.....	740,516	.....	150 00
Totals	64	3,150	34,519,633	.....	14,397,583	1,388	3,150 00
Joliette, Que.	1	50	800	.....	250	.....	50 00
Montreal, "	10	500	14,355,962	.....	5,852,027	.....	500 00
Quebec, "	4	200	3,685,713	.....	1,462,800	.....	200 00
Sherbrooke, "	1	50	1,380,630	.....	645,600	.....	50 00
Totals	16	800	19,423,105	.....	7,960,677	.....	800 00
St. John, N.B.	2	100	1,405,026	.....	521,794	.....	100 00
Halifax, N.S.	3	150	2,890,305	.....	979,936	241,079	150 00
Winnipeg, Man	7	325	3,328,839	.....	1,339,141	.....	325 00
Calgary, N.W.T.	4	200	1,595,915	.....	595,989	.....	200 00
Vancouver, B.C.	31	1,475	2,573,480	22,250	1,019,247	.....	3,847 40
Victoria, B.C.	6	300	1,510,780	4,000	499,626	52,715	416 60
Totals	37	1,775	4,084,260	26,250	1,518,873	52,715	4,264 00
Dawson, Y.T.	1	50	54,355	.....	21,992	.....	50 00
Grand Totals	134	6,550	67,301,438	26,250	27,335,985	295,182	9,039 00

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

W. J. GERALD,
Deputy Minister.

SESSIONAL PAPER No. 12

APPENDIX A—*Continued*—MALT LIQUOR.

No. 11.—Comparative Statement of Manufactures for the years ended June 30, 1903 and 1904.

Provinces.	Licenses.		Malt used.	Other commodities used.	Malt Liquor manufactured.	Malt Liquor exported, and used by H. M. Army and Navy.	Total Duty collected, including License Fees.
	No.	Fees.					
1903.		$	Lbs.	Lbs.	Galls.	Galls.	$ cts.
Ontario	62	3,100	34,061,783		14,215,227	1,177	3,100 00
Quebec	16	800	18,649,365		7,397,710	1,000	800 00
New Brunswick	2	100	1,358,370		504,736		100 00
Nova Scotia	4	200	2,708,699		911,200	168,118	200 00
Prince Edward Island	2	75	92,520		32,200		75 00
Manitoba	6	275	2,492,130		965,403		275 00
N. W. Territories	5	225	1,082,854		404,365		225 00
British Columbia	37	1,800	3,747,082	30,878	1,414,313	48,044	4,710 20
Totals	134	6,575	64,192,743	30,878	25,755,154	218,339	9,485 20
1904.							
Ontario	64	3,150	34,519,633		14,397,583	1,388	3,150 00
Quebec	16	800	19,423,105		7,960,677		800 00
New Brunswick	2	100	1,405,026		521,794		100 00
Nova Scotia	3	150	2,890,305		979,936	241,079	150 00
Manitoba	7	325	3,328,859		1,339,141		325 00
N. W. Territories	4	200	1,595,915		595,989		200 00
British Columbia	37	1,775	4,084,260	26,250	1,558,873	52,715	4,264 00
Yukon Territory	1	50	54,355		21,992		50 00
Totals	134	6,550	67,301,438	26,250	27,335,985	295,182	9,039 60

	1903.	1904.
	Galls.	Galls.
Exported	2,457	1,752
Used by H. M. Army and Navy	215,882	293,430
Totals	218,339	295,182

W. J. GERALD,
Deputy Minister.

Inland Revenue Department,
Ottawa, August 19, 1904.

APPENDIX A *Continued*—RAW LEAF TOBACCO, INCLUDING STEMS, SCRAPS AND CUTTINGS.

DR. No. 16—Warehouse Return for the Year ended June 30, 1901. CR.

Remaining in Warehouse from last year.	Imported.	Warehoused ex-Factory.	Received from other Divisions.	Totals.	Divisions.	Entered for Consumption. Quantity	Entered for Consumption. Duty.	Removed in bond to other Divisions.	Exported.	Written off.	Taken for Horticultural purposes, and destroyed.	Re-entered for Manufacture.	Remaining in Warehouse.	Totals.
Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.		Std. lbs.	$ cts.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.
1,357	1,327	2,818	9,008	17,510	Belleville, Ont.	12,460	1,246 00	.....	2,818	.....	.....	259	1,973	17,510
16,882	91,442	12,525	441	121,290	Brantford "	88,854	8,885 40	370	11,258	.....	41	150	20,614	121,290
23,574	72,431	4,422	8,476½	108,903½	Guelph "	82,647¼	8,355 73	1,143	3,339	.....	...	2,498¼	19,276	108,903½
588,413	2,097,575	319,995	19,185	3,025,168	Hamilton "	1,837,713	184,831 86	89,763	293,615	.....	.....	19,797	781,280	3,025,168
40,607	84,510	12,921	.....	138,038	Kingston "	54,381	5,506 52	13,782	7,984	.....	.....	1,247	60,641	138,038
169,267¾	710,355	143,422	27,073¼	1,050,118	London "	749,012¾	73,621 37	49,932	94,154	672	.....	13,416	172,931¼	1,050,118
6,629	4,983	2,387	11,595	25,591	Ottawa "	9,277¾	927 80	2,547	.....	.....	9,540	1,079¼	3,150	25,591
859	7,117	827	445¼	9,248¾	Owen Sound "	7,790¾	779 05	203	.....	.....	.....	655	600	9,248¾
649½	2,391	.....	4,285	7,325½	Perth "	5,218¾	521 89	308¼	634	..	.....	.....	1,164½	7,325½
709	1,644	.....	1,612	3,965	Peterborough "	1,710	171 00	.....	.....	.....	1,612	.....	643	3,965
.....	1,062	56	.....	1,118	Port Arthur "	622	62 20	.....	.....	..	.....	.....	496	1,118
3,352	10,298	550	.....	14,200	Prescott "	10,139	1,032 98	1,438	.....	.....	.....	550	2,073	14,200
18,003	26,119	3,271	953	48,346	St. Catharines "	23,143	2,316 46	118	3,699	298	.....	2,901	17,887	48,346
18,057	35,172	3,783	111	57,123	Stratford "	35,638	3,563 80	1,360	2,279	..	.....	633	17,213	57,123
129,897¾	394,814	54,774	6,455¼	585,941	Toronto "	383,582¾	46,712 79	20,355¼	49,330	73	763	18,923¾	112,913¼	585,941
15,276	30,087	4,609	2,601	52,573	Windsor "	30,396	3,131 92	2,845	2,717	.....	.....	1,114	15,531	52,573
1,036,532½	3,571,327	566,360	92,242	5,266,461½	... Totals.	3,302,888¾	341,699 77	184,131½	471,827	1,043	11,959	63,223	1,231,386¼	5,266,461½
486¼	.....	144¼	6,242	6,872¾	Joliette, Que.	4,104	1,060 16	144¼	.....	.....	.....	2	2,622¼	6,872¾
4,607,020¼	8,625,833	230,847	178,019½	13,641,719¾	Montreal "	7,845,918¼	807,717 97	123,110	210,065¼	4,712	369	78,718	5,378,797¼	13,641,719¾
72,856½	202,039½	27,870	45,113¾	347,879¾	Quebec "	246,486¾	36,889 16	15,283	2,909	.....	.....	12,451	100,750	347,879¾
14,623	25,209	.....	3,555	43,387	St. Hyacinthe "	33,745	3,374 50	.....	.....	.....	.....	1,344	8,328	43,387
123,287	205,604	16,674	15,036½	360,601½	Sherbrooke "	201,685	32,908 98	14,176	6,594	.....	.....	13,910	124,206½	360,601½
2,109	2,398	78	3,324¾	7,909¾	Three Rivers "	5,325¾	794 22	183	1,206	.....	.....	1	1,194	7,909¾
4,820,382¼	9,061,083½	275,613¼	251,291½	14,408,370½	Totals	8,307,264¾	882,745 29	152,926¼	220,771¼	4,712	369	106,426	5,645,898¾	14,408,370½
38,600½	56,443	8,372	3,878¼	107,293¾	St. John, N.B.	48,782¼	5,777 99	....	1,918	...	.....	3,802	52,791½	107,293¾

7,493½	9,612	.....	.....	17,105½	Halifax, N.S.	11,554½	1,155 45	.....	.....	.....	.....	5,551	17,105½
15,620	36,025	.....	.....	51,645	Pictou "	27,792	2,779 20	.....	.....	.....	.....	23,853	51,645
23,113½	45,637	.....	.....	68,750½	Totals	39,346½	3,934 65	.....	.....	.....	.....	29,404	68,750½
66,620	149,998	.....	.....	216,618	Charlotte'n, P.E.I.	145,160	14,516 00	.....	.....	.....	.....	71,458	216,618
48,888½	185,096½	20,146	6,360	260,491	Winnipeg, Man.	164,259¼	16,436 73	12,794	9,614	110	544½	73,169¼	260,191
4,564	15,149	1,539	230	21,482	Calgary, N.W.T.	11,674	1,167 40	230	1,042	.....	.....	8,536	21,482
43,585½	92,530	9,419	608	146,142½	Vancouver, B.C.	85,449½	8,656 31	3,279	6,246	.....	747	50,421	146,142½
13,301	33,426	5,484	522	52,733	Victoria "	34,875	3,520 95	1,768	2,815	.....	1,151	12,124	52,733
56,886½	125,956	14,903	1,130	198,875½	Totals	120,324½	12,177 26	5,047	9,061	.....	1,898	62,545	198,875½
6,095,587¾	13,210,690	886,933¼	355,131¾	20,548,342¾	Grand Totals	12,139,700	1,278,155 09	355,131¾	714,236¼	5,865	12,328	175,893½	7,145,188¼	20,548,342¾

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

W. J. GERALD,
Deputy Minister.

No. 17.—Comparative Statement of Warehouse Returns for the Years ended June 30, 1903 and 1904.

Remaining in Warehouse from last year.	Imported.	Warehoused ex-Factory.	Received from other Divisions.	Totals.	Provinces.	Entered for Consumption. Quantity.	Entered for Consumption. Duty.	Removed in bond to other Divisions.	Exported.	Written off.	Taken for Horticultural purposes, and destroyed.	Re-entered for Manufacture.	Remaining in Warehouse.	Totals.
Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.	1903.	Std. lbs.	$ cts.	Std. lbs.	Std. lbs.	S. lbs.	S. lbs.	Std. lbs.	Std. lbs.	Std. lbs.
1,019,086	3,079,572½	439,471	84,082½	4,622,212	..Ontario.....	3,027,106¾	314,058 77	111,281¾	407,120	1,681	7,710	30,780	1,036,532½	4,622,212
4,517,849½	8,376,481½	257,303½	157,449¾	13,309,083¾	..Quebec.....	8,029,684¼	878,512 24	124,446¼	219,599¾	7,279	267	107,425¼	4,820,382¼	13,309,083¾
31,866½	61,692½	2,816	2,115¼	98,490¼	..New Brunswick...	48,386¾	5,698 45	886	2,816	7,801	.....	.....	38,600½	98,490¼
25,611½	68,712	.....	886	95,209½	..Nova Scotia.....	70,923	7,092 66	.....	.....	.....	1,173	.....	23,113½	95,209½
60,032	201,809	.....	.....	261,841	..P. E. Island.....	160,315	16,168 94	.....	.....	34,906	.....	.....	66,620	261,841
40,114½	153,080½	18,886	3,674	215,755	..Manitoba.....	149,433½	14,943 35	8,646	8,668	....	119	.....	48,888½	215,755
1,465	13,041	1,413	521½	16,440½	..N. W. Territories.	11,505½	1,150 55	371	.....	.....	.....	.....	4,564	16,440½
43,069	132,790	18,684	2,894	197,437	..British Columbia..	118,608½	11,944 21	5,992	15,598	.....	.....	352	56,886½	197,437
5,739,093¾	12,087,178¾	738,573½	251,623	18,816,469	.....Totals.....	11,615,963¼	1,249,569 17	251,623	653,801¾	51,667	9,269	138,557¼	6,095,587¾	18,816,469
					1904.									
1,036,532½	3,571,327	566,360	92,242	5,266,461½	..Ontario.....	3,302,888¾	341,699 77	184,134½	471,827	1,043	11,959	63,223	1,231,386½	5,266,461½
4,820,382¼	9,061,083½	275,613¼	251,291½	14,408,370½	..Quebec.....	8,307,264¼	882,745 29	152,926½	220,774¼	4,712	369	106,426	5,615,898¼	14,408,370½
38,600½	56,443	8,372	3,878¼	107,293¾	..New Brunswick...	48,782¼	5,777 99	.....	1,918	.....	.....	3,802	52,791½	107,293¾
23,113½	45,637	.....	.....	68,750½	..Nova Scotia.....	39,346½	3,934 65	.....	.....	.....	.....	.....	29,404	68,750½
66,620	149,998	.....	.....	216,618	..P. E. Island.....	145,160	14,516 00	.....	.....	.....	.....	.....	71,458	216,618
48,888½	185,096½	20,146	6,360	260,491	..Manitoba.....	164,259¼	16,436 73	12,794	9,614	110	.....	544½	73,169¼	260,491
4,564	15,149	1,539	230	21,482	..N. W. Territories.	11,674	1,167 40	230	1,042	.....	.....	.....	8,536	21,482
56,886½	125,956	14,903	1,130	198,875½	..British Columbia..	120,324½	12,177 26	5,047	9,061	.....	.....	1,898	62,545	198,875½
6,095,587¾	13,210,690	886,933¼	355,131¾	20,548,342¾	.....Totals.....	12,139,700	1,278,455 09	355,131¾	714,236¼	5,865	12,328	175,893½	7,145,188¼	20,548,342¾

Inland Revenue Department,
Ottawa, August, 19, 1904.

W. J. GERALD,
Deputy Minister.

APPENDIX A—*Continued*—CANADA TWIST TOBACCO.

No. 18.—STATEMENT of Revenue collected from Canada Twist Tobacco for the Year ended June 30, 1904.

DIVISIONS.	LICENSES.		Canada Twist, at 5 cts. per pound.	Total Duty Collected, including License Fees.
	No.	Fees.		
		$	Lbs.	$ cts.
Cornwall, Ont	2	4	100	9 00
Ottawa "	5	10	1,220	71 00
Prescott "	1	2	160	10 00
Totals	8	16	1,480	90 00
Joliette, Que	7	12	29,800	1,502 00
Montreal "	24	48	16,491½	872 58
Totals	31	60	46,291½	2,374 58
Grand Totals	39	76	47,771½	2,464 58

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

CANADA TWIST TOBACCO.

No. 19.—COMPARATIVE STATEMENT for Years ended June 30, 1903 and 1804.

YEARS.	PROVINCES.	LICENSES.		Canada Twist, at 5 cts. per pound.	Total Duty Collected, including License Fees.
		No.	Fees.		
			$	Lbs.	$ cts.
1903	Ontario	8	16	3,388	185 40
	Quebec	51	96	49,868	2,589 40
	Totals	59	112	53,256	2,774 80
1904	Ontario	8	16	1,480	90 00
	Quebec	31	60	46,291½	2,374 58
	Totals	39	76	47,771½	2,464 58

W. J. GERALD.
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

APPENDIX A—*Continued*—CIGARS.

No. 20.—RETURN of Manufactures

DIVISIONS.	LICENSES.		Total weight of Raw Leaf Tobacco and all other materials actually used.	Deficiencies paying duty.	CIGARS AT $3 PER THOUSAND.			CIGARS
	No.	Fees.			Produced.	Paid Duty.	Warehoused.	Produced.
		$ cts.	Lbs.	No.	No.	No.	No.	No.
Belleville, Ont.	1	75 00	11,687					633,900
Brantford "	7	525 00	78,757					4,339,650
Guelph "	12	900 00	82,413½					5,189,270
Hamilton "	16	1,200 00	211,978		9,006	3,057	5,949	10,667,170
Kingston "	2	150 00	46,319		1,500	1,500		2,567,300
London "	23	1,687 50	593,467¾					33,138,565
Ottawa "	1	75 00	9,341					447,700
Owen Sound "	2	150 00	8,511					448,880
Perth "	1	75 00	3,602¼					226,395
Peterborough, Ont.	1	75 00	1,912					119,300
Port Arthur "	1	37 50	469					22,000
Prescott "	3	225 00	11,459					679,950
St. Catharines "	10	750 00	23,535	1,300				1,411,575
Stratford "	3	225 00	33,199	475				1,797,840
Toronto "	23	1,662 50	303,498¾		504	354	150	16,596,235
Windsor "	8	515 00	30,937					1,647,270
Totals	114	8,327 50	1,451,086¼	1,775	11,010	4,911	6,099	79,933,000
Joliette, Que.	5	305 00	58,828¾	550				12,500
Montreal "	40	2,902 50	1,164,933	6,310	2,160	2,160		60,984,130
Quebec "	8	570 00	126,243¾		5,010	5,010		7,245,305
St. Hyacinthe, Que.	3	175 00	45,980					2,090,815
Sherbrooke "	7	387 50	133,013					7,607,900
Three Rivers "	2	140 00	17,0 9¼					268,220
Totals	65	4,480 00	1,546,007¾	6,860	7,170	7,170		78,208,870
St. John, N.B.	6	430 00	65,181¼					973,975
Halifax, N.S.	3	225 00	11,855½					650,035
Winnipeg, Man.	11	825 00	144,373¾	850				7,844,600
Calgary, N.W.T.	3	225 00	10,000	4,218				498,420
Vancouver, B.C.	16	1,142 50	74,103½		2,202	2,202		4,037,400
Victoria "	12	890 00	32,288	*2,042				1,645,300
Totals	28	2,032 50	106,391½	2,042	2,202	2,202		5,682,700
Grand Totals	230	16,545 00	3,334,896½	15,745	20,382	14,283	6,099	173,791,600

* 1,877 of these cigars made of combination leaf at $3 per M.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

for the Year ended June 30, 1904.

AT $6 PER THOUSAND.		CANADIAN CIGARS AT $3 PER THOUSAND.			COMBINATION CIGARS AT $3 PER THOUSAND.			Total Duty Collected ex-manufactory, including License Fees.
Paid Duty.	Warehoused	Produced.	Paid Duty.	Warehoused.	Produced.	Paid Duty.	Warehoused.	
No.	No.	No.	No.	No.	No.	No.	No.	$ cts.
221,000	412,900							1,401 00
2,888,800	1,450,850							17,857 80
2,602,010	2,587,260							16,512 06
3,480,620	7,186,550							22,105 12
786,000	1,781,300							4,876 50
20,605,355	12,533,210							125,319 63
1,050	446,650							81 30
159,380	289,500							1,106 28
4,020	222,375							99 12
112,750	6,550							751 50
22,000								169 50
457,800	222,150							2,971 80
1,106,825	304,750							7,398 75
1,417,565	380,275							8,733 24
11,692,705	4,903,530	14,000	14,000					71,863 22
1,132,070	515,200				92,700	58,800	33,900	7,483 82
46,689,950	33,243,050	14,000	14,000		92,700	58,800	33,900	288,730 64
1,060	11,500	1,240,870	886,920	353,950	1,927,950	1,501,950	426,000	7,480 91
25,860,090	35,124,040	6,400	6,400		750,545	457,310	293,235	159,507 16
3,042,650	4,202,655				360,300	185,400	174,900	19,417 16
228,500	1,862,315	600,400	600,400					3,347 20
3,608,825	3,999,075	154,020	101,320	52,700				22,344 41
126,170	142,050				791,020	513,620	277,400	2,437 88
32,867,235	45,341,635	2,001,690	1,595,040	406,650	3,829,815	2,658,280	1,171,535	214,534 72
344,225	629,750				3,156,670	727,380	2,429,290	4,677 49
326,140	323,895							2,181 84
2,447,250	5,397,350							15,513 60
204,545	293,875							1,477 57
3,780,850	256,550				80,825	80,825		24,085 48
1,254,400	390,900				61,225	61,225		8,606 72
5,035,250	647,450				142,050	142,050		32,692 20
87,914,595	85,877,005	2,015,690	1,609,040	406,650	7,221,235	3,586,510	3,634,725	559,808 06

W. J. GERALD,
Deputy Minister.

APPENDIX A—*Continued*—CIGARS.

DR. No. 21.—COMPARATIVE STATEMENT of Manufactures

PROVINCES.	LICENSES.		Total weight of Raw Leaf Tobacco and all other materials actually used.	Deficiencies paying Duty.	CIGARS AT $7 PER THOUSAND.			CIGARS
	No.	Fees.			Produced.	Paid Duty	Warehoused.	Produced.
1903.		$ cts.	Lbs.	No.	No.	No.	No.	No.
Ontario	115	8,550 00	1,384,624¾	14,725	1,521	1,521	.....	78,734,315
Quebec	62	4,290 00	1,425,791¼	65,107	9,294	9,294	....	69,039,580
New Brunswick	7	495 00	66,431¾	....	.....	.....	...	921,665
Nova Scotia	3	225 00	13,623	.....	.....	.....	...	754,105
Manitoba	9	675 00	131,551½	.....	.....	.....	..	7,139,550
North-west Territories	2	150 00	9,939½	.....	.....	.....	.....	480,885
British Columbia	26	1,850 00	99,415½	*5,043	1,002	1,002	...	5,315,425
Totals	224	16,235 00	3,131,377¼	84,875	11,817	11,817	....	162,385,525
1904.								
Ontario	114	8,327 50	1,451,086¼	1,775	11,010	4,911	6,099	79,933,000
Quebec	65	4,480 00	1,546,007½	6,860	7,170	7,170	.....	78,208,870
New Brunswick	6	430 00	65,181¼	....	.....	.....	.....	973,975
Nova Scotia	3	225 00	11,855½	.....	.....	.....	....	650,035
Manitoba	11	825 00	144,373¾	850	.....	.....	.....	7,844,600
North-west Territories	3	225 00	10,600	4,218	.....	.....	....	498,420
British Columbia	28	2,032 50	106,391½	2,042	2,202	2,202	.....	5,682,700
Totals	230	16,545 00	3,334,896½	15,745	20,382	14,283	6,099	173,791,600

*Combination cigars at $3 per M. †1,877 of these cigars made of combination leaf at $3 per M.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

for the years ended June 30, 1903 and 1904. CR.

At $6 per Thousand.		Canadian Cigars at $3 per Thousand.			Combination Cigars at $3 per Thousand.			Total Duty collected ex-Manufactory, including License Fees
Paid Duty.	Warehoused	Produced.	Paid Duty	Warehoused.	Produced	Paid Duty	Warehoused.	
No.	No.	No.	No.	No.	No.	No.	No.	No.
45,218,890	33,515,425							279,962 33
29,937,745	39,101,835	2,935,560	2,185,260	750,300	3,941,605	1,957,955	1,983,650	196,801 86
316,015	605,650				2,623,875	679,225	1,944,650	4,428 77
350,950	403,155							2,330 70
2,377,960	4,761,590							14,942 76
208,385	272,500							1,460 31
4,620,250	695,175				97,850	97,850		29,887 19
83,030,195	79,355,330	2,935,560	2,185,260	750,300	6,663,330	2,735,030	3,928,300	529,753 92
46,689,950	33,243,050	14,000	14,000		92,700	58,800	33,900	288,730 64
32,867,235	45,341,635	2,001,690	1,595,040	406,650	3,829,815	2,658,280	1,171,535	214,534 72
344,225	629,750				3,156,670	727,380	2,429,290	4,677 49
326,140	323,895							2,181 84
2,447,250	5,397,350							15,513 60
204,545	293,875							1,477 57
5,035,250	647,450				142,050	142,050		32,692 20
87,914,595	85,877,005	2,015,690	1,609,040	406,650	7,221,235	3,586,510	3,634,725	559,808 06

W. J. GERALD,
Deputy Minister.

APPENDIX A—*Continued*—INSPECTION OF PETROLEUM.

No. 24.—RETURN of Canadian Petroleum and Naphtha inspected during the Year ended June 30, 1904.

DIVISIONS.	LICENSES.		Petroleum.	Naphtha.	Total.
	No.	Fees.			
		$	Galls.	Galls.	Galls.
London	2	2	6,526,896·91	765,216 04	7,292,112·95

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

No. 25.—Comparative Statement of Petroleum and Naphtha inspected during the Years ended June 30, 1903 and 1904.

Provinces.	Licenses.		Petroleum.	Naphtha.	Totals.
	No.	Fees.			
1903.		$	Galls.	Galls.	Galls.
Ontario	2	2	7,784,179·80	831,712·21	8,615,892·01
1904.					
Ontario	2	2	6,526,896·91	765,216·04	7,292,112·95

W. J. GERALD,
Deputy Minister.

Inland Revenue Department,
Ottawa, August 19, 1904.

APPENDIX A—*Continued*—MANUFACTURES IN BOND.

No. 26.—RETURN of Manufactures

DIVISIONS.	LICENSES.		MATERIALS USED.			
	No.	Fees.	Spirits.	Beer, Wine, &c.	Nitric Acid.	Mercury.
		$ cts	Galls.	Galls.	Lbs.	Lbs.
Brantford, Ont.	2	100 00	9,629·33	3·00	.....	.....
Hamilton "	2	100 00	20,532·91	333·30	.....	.....
Kingston "	1	50 00	8,162 34	231·91	.....	.....
Ottawa "	1	25 00	200·64	.....	.....	.....
Prescott "	1	300 00	189,260·32	.....	930,730	100,499
Toronto "	6	275 00	62,824·20	809·50	.....	.....
Windsor "	4	700 00	10,356·44	.....	50,966	6,141½
Totals	17	1,550 00	300,966·18	1,377·71	981,696	106,640½
Montreal, Que.	10	450 00	48,941·63	970·70	.....	.....
Quebec "	1	50 00	.....	.....	.....	.....
St. Hyacinthe, Que.	2	100 00	22,471·09	235·30	.....	.....
Sherbrooke "	1	300 00	25,548·28	.....	117,778	15,352
Totals	14	900 00	96,961·00	1,206·00	117,778	15,352
St. John, N.B.	2	100 00	7,574·65	206·20	.....	.....
Winnipeg, Man.	1	50 00	.....	.....	.....	.....
Grand Totals	34	2,600 00	405,501·83	2,789·91	1,099,474	121,992½

INLAND REVENUE DEPARTMENT.
OTTAWA, August 19, 1904.

for the Year ended June 30, 1904.

Manufactured.		Paid Duty ex-Manufactory.		Warehoused.		Total Duty Collected ex-Manufactory, including License Fees.
Vinegar.	Crude Fulminate.	Vinegar.	Duty.	Vinegar.	Crude Fulminate.	
Galls.	Lbs.	Galls	$ cts.	Galls.	Lbs.	$ cts.
40,980·53	.....	40,980·53	1,643 43	.....	.....	1,743 43
131,847·48	.....	21,820·77	872 83	110,026·71	.....	972 83
60,152·42	.....	12,102·36	484 10	48,050·06	.....	534 10
788·71	.....	210·83	8 43	577·88	.....	33 43
.....	121,008	.....	.....	.....	121,008	300 00
396,883·39	.....	235,721 45	8,428 97	161,161 94	7,071	8,763 97
.....	7,071	.....	.....	.....	.....	700 00
630,652·53	128,079	310,835·94	11,437 76	319,816·59	128,079	12,987 76
257,396·30	.....	161,530·06	6,461 23	95,866 24	.....	6,911 23
.....	.....	.....	.....	.....	.....	50 00
117,548·93	.....	14,361·26	574 45	103,187 67	.....	674 45
.....	17,559	.....	.....	.....	17,559	300 00
374,945·23	17,559	175,891·32	7,035 68	199,053 91	17,559	7,935 68
46,914·99	.....	41,669·27	1,666 76	5,245 63	.....	1,766 76
.....	.....	.....	.....	.....	.....	50 00
1,052,512·66	145,638	528,396·53	20,140 20	524,116·13	145,638	22,740 20

W. J. GERALD,
Deputy Minister.

APPENDIX A—*Continued*—MANUFACTURES IN BOND.

No. 27.—Comparative Statement of Manufactures

Provinces.	Licenses.		Materials Used.			
	No.	Fees.	Spirits.	Beer, Wine, &c.	Nitric Acid.	Mercury.
1903.		$	Galls.	Galls.	Lbs.	Lbs.
Ontario	13	1,150	272,806·58	*106·30 1,267·20	846,918	90,812
Quebec	9	700	138,964·24	1,728·30	261,515	33,607
New Brunswick	2	100	6,859·77	256·10	.....	.....
Manitoba	1	50	.....	.....	.....	.....
Totals	25	2,000	418,630·59	3,245·60 *106·39	1,108,433	124,419
1904.						
Ontario	17	1,550	300,966·18	1,377·71	981,696	106,640½
Quebec	14	900	96,961·00	1,206·00	117,778	15,352
New Brunswick	2	100	7,574·65	206·20	.....	.....
Manitoba	1	50	.....	.....	.....	.....
Totals	34	2,600	405,501·83	2,789·91	1,099,474	121,992½

* Malt Extract.

Inland Revenue Department,
Ottawa, August 19, 1904.

for the Years ended June 30, 1903 and 1904.

Manufactured.		Paid Duty ex-Manufactory.		Warehoused.		Total Duty, Collected ex-Manufactory, including License Fees.
Vinegar.	Crude Fulminate.	Vinegar.	Duty.	Vinegar.	Crude Fulminate.	
Galls.	Lbs.	Galls.	$ cts.	Galls.	Lbs.	$ cts.
629,821·43	110,222·00	268,659·76	10,804 21	361,161·67	110,222·00	11,954 21
429,689·76	38,878·00	284,429·59	11,377 18	145,260 17	38,878 00	12,077 18
41,881 24	.....	35,857 16	1,434 24	6,024·08	....	1,534 24
.....	.....	.....	.....	.....	.....	50 00
1,101,392·43	149,100·00	588,946 51	23,615 63	512,445·92	149,100·00	25,615 63
630,652·53	128,079·00	310,835 94	11,437 76	319,816·59	128,079.00	12,987 76
374,945·23	17,559·00	175,891·32	7,035 68	199,053·91	17,559·00	7,935 68
46,914·90	.....	41,669 27	1,666 76	5,245 63	.....	1,766 76
.....	.....	.....	.....	.....	.....	50 00
1,052,512·66	145,638·00	528,396 53	20,140 20	524,116·13	145,638·00	22,740 20

W. J. GERALD,
Deputy Minister.

APPENDIX A—*Continued*—MANUFACTURES IN BOND.

DR. No. 28.—WAREHOUSE RETURN for

Remaining in Warehouse from last year.	Warehoused.		Received from other Divisions.	Totals.		DIVISIONS.
Vinegar.	Vinegar.	Crude Fulminate	Vinegar.	Vinegar.	Crude Fulminate.	
Galls.	Galls.	Lbs.	Galls.	Galls.	Lbs.	
38,358 03	110,026 71			148,384 74		Hamilton, Ont..
17,027 01	48,050 06			65,077 07		Kingston, "
	577 88			577 88		Ottawa, "
		121,008			121,008	Prescott, "
82,630 05	161,161 94			243,791 99		Toronto, "
		7,071			7,071	Windsor, "
138,015 09	319,816 59	128,079		457,831 68	128,079	Totals..
63,634 45	95,866 24			159,500 69		Montreal, Que.
9,453 28			9,118 80	18,572 08		Quebec, "
56,464 59	103,187 67			159,652 26		St. Hyacinthe, Que.
		17,559			17,559	Sherbrooke, "
129,552 32	199,053 91	17,559	9,118 80	337,725 03	17,559	Totals.
1,862 53	5,245 63			7,108 16		St. John, N.B
7,616 32			42,212 84	49,829 16		Winnipeg, Man.
277,046 26	524,116 13	145,638	51,331 64	852,494 03	145,638	Grand Totals.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

the Year ended June 30, 1904.

Entered for Consumption.		Removed to other Divisions.	Exported.	Remaining in Warehouse.	Totals.	
Vinegar.	Duty.	Vinegar.	Crude Fulminate.	Vinegar.	Vinegar.	Crude Fulminate.
Galls.	$ cts.	Galls.	Lbs.	Galls.	Galls.	Lbs.
97,020 39	3,880 81	7,982 73	.....	43,381 62	148,384 74	.....
47,742 02	1,909 67	.....	.....	17,335 05	65,077 07	.....
577 88	23 11	.....	.....	.....	577 88	.....
.....	.....	.....	121,008	.....	.....	121,008
146,821 27	5,872 87	25,142 80	.....	71,827 92	243,791 99	.....
.....	.....	.....	7,071	.....	.....	7,071
292,161 56	11,686 46	33,125 53	128,079	132,544 59	457,831 68	128,079
105,902 52	4,236 08	9,087 31	.....	44,510 86	159,500 69	.....
7,213 23	288 54	.....	.....	11,358 85	18,572 08	.....
86,084 76	3,443 36	9,118 80	.....	64,448 70	159,652 26	.....
.....	.....	.....	17,559	.....	.....	17,559
199,200 51	7,967 98	18,206 11	17,559	120,318 41	337,725 03	17,559
1,862 53	74 50	.....	.....	5,245 63	7,108 16	.....
46,854 16	1,874 14	.....	.....	2,975 00	49,829 16	.....
540,078 76	21,603 08	51,331 64	145,638	261,083 63	852,494 03	145,638

W. J. GERALD,
Deputy Minister.

APPENDIX A—*Continued*—MANUFACTURES IN BOND.

No. 29.—COMPARATIVE STATEMENT of Warehouse Returns

Remaining in Warehouse from last year.	Warehoused.		Received from other Divisions.	Totals.		PROVINCES.
Vinegar.	Vinegar.	Crude Fulminate.	Vinegar.	Vinegar.	Crude Fulminate.	
Galls.	Galls.	Lbs.	Galls.	Galls.	Lbs.	1903.
116,944·70	361,161·67	110,222·00	.....	478,106·37	110,222·00	..Ontario .....
130,771·36	145,260·17	38,878·00	.....	276,031·53	38,878·00	..Quebec .....
2,079·71	6,024·08	.....	.....	8,103·79	.....	..New Brunswick .....
.....	.....	.....	51,197·10	51,197·10	.....	..Manitoba.....
249,795·77	512.445·92	149.100·00	51,197·10	813,438·79	149,100·00	.....Totals .....
						1904.
138,015·09	319,816·59	128,079·00	.....	457,831·68	128,079·00	..Ontario .....
129,552·32	199,053·91	17,559·00	9,118·80	337,725·03	17,559·00	..Quebec .....
1,862·53	5,245·63	.....	.....	7,108·16	.....	..New Brunswick.....
7,616·32	.....	.....	42.212·84	49,829·16	.....	..Manitoba.....
277,046·26	524,116·13	145.638·00	51.331·64	852,494·03	145,638·00	.....Totals .....

INLAND REVENUE DEPARTMENT.
OTTAWA, August 19, 1904.

for the years ended June 30, 1903 and 1904.

Entered for Consumption.		Removed to other Divisions.	Exported.	Remaining in Warehouse.	Totals.	
Vinegar.	Duty.	Vinegar.	Crude Fulminate.	Vinegar.	Vinegar.	Crude Fulminate.
Galls.	$ cts.	Galls.	Lbs.	Galls.	Galls.	Lbs.
288,894·18	11,555·79	51,197·10	110,222·00	138,015·09	478,106·37	110,222·00
146,479·21	5,859·24	....	38,878·00	129,552·32	276,031·53	38,878·00
6,241·26	249·65	....	....	1,862·53	8,103·79	....
43,580·78	1,743·23	....	....	7,616·32	51,197·10	....
485,195·43	19,407·91	51,197·10	149,100·00	277,046·26	813,438·79	149,100·00
292,161·56	11,686·46	33,125·53	128,079·00	132,544·59	457,831·68	128,079·00
199,200·51	7,967·98	18,206·11	17,559·00	120,318·41	337,725·03	17,559·00
1,862·53	74·50	....	....	5,245·63	7,108·16	....
46,854·16	1,874·14	....	....	2,975·00	49,829·16	....
540,078·76	21,603·08	51,331·64	145,638·00	261,083·63	852,494·03	145,638·00

	1903.	1904.
Total duty collected ex-manufactory and ex-warehouse.....	$ 43,023·54	$ 42,743·28
" on licenses	2,000·00	2,600·00
Totals	$ 45,023·54	$ 45,343·28

W. J. GERALD,
Deputy Minister.

APPENDIX A—*Continued*—ACETIC ACID.

No. 30—RETURN of Manufactures for the Year ended June 30, 1904.

DIVISIONS.	LICENSES.		MANUFACTURED.	PAID DUTY EX-MANUFACTORY.		WAREHOUSED.	Total Duty collected ex-Manufactory, including License Fees.
	No.	Fees.	—	—	Duty.	—	
			Galls.	Galls.	$ cts.	Galls.	$ cts.
Toronto, Ont.	1	50	62,618·85	11,170·53	446 82	51,448·32	496 82
Montreal, Que.	1	50					50 00
Totals	2	100	62,618·85	11,170·53	446 82	51,448·32	546 82

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

APPENDIX A—*Continued*—ACETIC ACID.

No. 31—COMPARATIVE STATEMENT of Manufactures for the Years ended June 30, 1903 and 1904.

PROVINCES.	LICENSES.		MANUFACTURED.	PAID DUTY EX-MANUFACTORY.		WAREHOUSED.	Total Duty collected ex-Manufactory, including License Fees.
	No.	Fees.	—	—	Duty.	—	
1903.			Galls.	Galls.	$ cts.	Galls.	$ cts.
Ontario	1	50	213,922·62	64,993·22	2,599 74	148,929·40	2,649 74
Quebec	1	50	6,434·93	2,838·15	113 53	3,596·78	163 53
Totals	2	100	220,357 55	67,831·37	2,713 27	152,526·18	2,813 27
1904.							
Ontario	1	50	62,618·85	11,170·53	446 82	51,448·32	496 82
Quebec	1	50					50 00
Totals	2	100	62,618·85	11,170·53	446 82	51,448·32	546 82

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

SESSIONAL PAPER No. 12

APPENDIX A—*Continued*—ACETIC ACID.

No. 32—Warehouse Return for the Year ended June 30, 1904.

Dr.						Cr.			
Remaining in Warehouse from last year.	Warehoused.	Received from other Divisions.	Totals.	Divisions.	Entered for Consumption	Duty.	Removed to other Divisions.	Remaining in Warehouse.	Totals.
Galls.	Galls.	Galls.	Galls.		Galls.	$ cts.	Galls.	Galls.	Galls.
61,517·47	51,448·32	... .	112,965·79	Toronto.	43,994·73	1,759 79	34,863·51	34,107·55	112,965·79
3,596 78	...	34,863·51	38,460·29	Montreal.	9,858·71	394 36	.... ..	28,601·58	38,460·29
65,114·25	51,448 32	34,863·51	151,426·08	Totals.	53,853·44	2,154 15	34,863·51	62,709·13	151,426·08

W. J. GERALD,
Deputy Minister.

Inland Revenue Department,
Ottawa, August 19, 1904.

APPENDIX A—*Continued*—ACETIC ACID.

No. 33—Comparative Statement of Warehouse Returns for the Years ended June 30, 1903 and 1904.

Dr.							Cr.		
Remaining in Warehouse from last year.	Warehoused.	Received from other Divisions.	Totals.	Provinces.	Entered for Consumption	Duty.	Removed to other Divisions.	Remaining in Warehouse.	Totals.
Galls.	Galls.	Galls.	Galls.	1903.	Galls.	$ cts.	Galls.	Galls.	Galls.
.....	148,929·40	.....	148,929·40	Ontario ..	82,880·86	3,315 22	4,531·07	61,517·47	148,929·40
..	3,596·78	.....	3,596·78	Quebec. .	.....	.....	.....	3,596·78	3,596·78
.....	152,526·18	.....	152,526·18	.. Totals..	82,880·86	3,315 22	4,531·07	65,114·25	152,526·18
				1904.					
61,517·47	51,448·32	.....	112,965·79	..Ontario ..	43,994·73	1,759 79	34,863·51	34,107·55	112,965·79
3,596·78	.....	34,863·51	38,460·29	..Quebec...	9,858·71	394 36	.....	28,601·58	38,460·29
65,114·25	51,448·32	34,863·51	151,426·08	....Totals..	53,853·44	2,154 15	34,863·51	62,709·13	151,426·08

	1903.	1904.
Total duty collected, ex-manufactory and ex-warehouse.....	$ 6,028 49	$ 2,600 97
" " on licenses	100 00	100 00
	$ 6,128 49	$ 2,700 97

W. J. GERALD.
Deputy Minister.

Inland Revenue Department,
Ottawa, August 19, 1904.

METHYLATED SPIRITS.

No. 34—STATEMENT showing the quantity of Raw Materials on hand at beginning and end of year, and brought in and used during the year 1903-1904.

(A)

DR. Names of Articles.	Stock on hand, July1,1903	Brought in during the year.	Total to be Accounted for	Used in manufacture of Methylated Spirits.	Sold.	Stock on hand June 30, 1904.	Total Accounted for CR.
	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.
Alcohol	5,260·20	64,639·78	69,899·98	66,052·35	138·10	3,709·53	69,899·98
Wood Naphtha..	2,712·54	23,046·94	5,759·48	23,417·78	....	2,341·70	25,759·48

(B)

STATEMENT showing the quantity of Raw Materials used, and Methylated Spirits produced therefrom.

Alcohol used Statement (A) above.	Wood Naphtha used Statement (A) above.	Methylated Spirits used Statement (C) below.	Total to be Accounted for.	Methylated Spirits produced.	Loss in Manufacture.		Total Accounted for.
Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	p.c.	Pr'f galls.
66,052·35	23,417·78	.....	89,470·13	87,745·67	1,724·46	1·96	89,470·13

(C)

STATEMENT showing the quantity of Methylated Spirits on hand at beginning and end of year, and brought in, sold and otherwise accounted for during the year.

Stock on hand July 1, 1903.	Manufactured as above Statement (B).	Brought in during the year.	Total to be Accounted for.	Sold.	Used in Methylated Spirits Warehouse.	Re-used in Manufacture of Methylated Spirits.	Stock on hand June 30, 1904.	Total Accounted for.
Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.
4,268·79	87,745·67	....	92,014·46	87,291·62	.....	.....	4,722·84	92,014·46

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

DR. No. 35.—HYDRAULIC and other Rents, &c.,

Balances due on July 1, 1903.	Rents accrued up to June 30, 1904.	Totals.	Number.	Location.	Original Lessees.	Present Occupants.
$ cts.	$ cts.	$ cts.				
100 00	200 00	300 00	1	Ottawa River	Perley & Pattee	J. R. Booth
50 00	100 00	150 00	2	"	Thomson & Perkins	"
150 00	300 00	450 00	3	"	Lyman Perkins	"
150 00	300 00	450 00	4	"	R. Blackburn *et al*	McKay Milling Co., Ltd
	100 00	100 00	5	"	J. & J. Petrie	Ottawa Electric Co.
	100 00	100 00	6	"	A. H. Baldwin	"
	300 00	300 00	7	"	Ottawa Electric Ry. Co.	"
	400 00	400 00	8	"	Perley & Pattee	"
	100 00	100 00	9	"	J. M. Currier	N. S. Blaisdell
	600 00	600 00	10	"	Harris, Bronson & Co	The Bronson & Weston Lumber Co.
	200 00	200 00	11	"	Levi Young	Ottawa Electric Ry. Co
	104 00	104 00	12	"	J. R. Booth	
	10 00	10 00	13	"	Bronson & Weston	
	100 00	100 00	14	"	"	
	96 00	96 00	15	"	Perley & Pattee	J. R. Booth
64 00	8 00	72 00	16	"	L. M. Coutlee	Mary Comoy
570 84		570 84	17	"	John Rochester	
	25 00	25 00	18	"	Nérée Tétreau	Thomas Ahearn
200 00		200 00	19	"	Hon. J. Skead	
96 00		96 00	20	"	"	
	1 00	1 00	21	"	G. A. Grier & Co	Ottawa Electric Ry. Co
380 00		380 00	22	"	John Rankin	
75 00	150 00	225 00	23	"	J. R. Booth	
60 00	5 00	65 00	24	"	Colin Dewar	
	50 00	50 00	25	"	Bronson & Weston	
	1 00	1 00	26	"	Alfred Desjardins	
	100 00	100 00	27	"	The Bronson Co.	
	10 00	10 00	28	"	Ottawa Electric Co.	
	1 00	1 00	1	St. Lawrence	Que. Har. Commissioners	
125 00	25 00	150 00	2	"	Rich. and Ont. Nav. Co.	
	1 00	1 00	3	Quebec	Corporation de Quebec	
	1 00	1 00	4	"	Narcisse Blais	
5 00		5 00	5	Richibucto Har.	Wm. Hudson	
	1 00	1 00	6	Rondeau Har.	School Trustees	
	1 00	1 00	7	Collingwood Har.	Great North'n Transit Co	
	1 00	1 00	8	Ottawa	E. G. Laverdure	
	1 00	1 00	9	Walkerton, Ont	D. Rob'tson & J. Rowland	
	1 00	1 00	10	Three Rivers	Corporation de Three-Riv	
100 00	100 00	200 00	11	"	W. Ritchie	
165 00		165 00	12	British Columbia	A. Peel	
90 00		90 00	13	"	Jonathan Maury	
75 00	25 00	100 00	14	"	Roderick Finlayson	
25 00	25 00	50 00	15	"	Joseph Spratt	
	1 00	1 00	16	"	Bank of British Columbia	
	1 00	1 00	17	"	W. Dodd	
	12 00	12 00	18	"	D. W. Gordon	
5 00		5 00	19	"	S. Williams	
5 00	5 00	10 00	20	"	Geo. H. Huff	
	1 00	1 00	21	"	Canadian Pac. Ry. Co.	

Lessees' Accounts, 1903–1904. CR.

Description of Property.	Number.	Date to which Account is made up.	Paid during Fiscal Year.	Balances due on June 30, 1904.	Totals.
			$ cts.	$ cts.	$ cts.
Lots B and C, Chaudière St., service ground	1	June 30, 1904	200 00	100 00	300 00
Lot D	2	" 30, 1904	100 00	50 00	150 00
Lots E, F and G, South Head St.	3	" 30, 1904	300 00	150 00	450 00
Lots H, I and J, grist mill, North Head St.	4	" 30, 1904	300 00	150 00	450 00
Lot K, fanning mill, South Head St	5	Dec. 31, 1903	100 00	....	100 00
Lot L, service ground	6	" 31, 1903	100 00	....	100 00
Lots Q, R and T, service ground, North Middle St	7	" 31, 1903	300 00	....	300 00
Lots M, N, O and P, service ground (no water used)	8	" 31, 1903	400 00	....	400 00
Lot S, service ground	9	June 30, 1904	100 00	....	100 00
Lots U, V, W, X, Y and Z, service ground	10	" 30, 1904	600 00	....	600 00
Two strips of land	11	Jan. 1, 1905	200 00	....	200 00
Lumber yard at head of slides	12	Sept. 20, 1904	104 00	....	104 00
Bridge over slides	13	June 30, 1905	10 00	....	10 00
Strip of land, Amelia Island	14	Jan. 1, 1905	100 00	....	100 00
Reserve, head of Chaudière Island	15	" 1, 1905	96 00	....	96 00
Small island, Deschênes Rapids	16	" 1, 1904	....	72 00	72 00
Portion of lot 39, Concession 'A,' Nepean	17	Feb. 1, 1885	....	570 84	570 84
Excavated channel slide and two dams, Little Chaudière	18	Mar. 1, 1905	25 00	....	25 00
Water lots opposite lot 30, Concession 'A,' Nepean	19	Dec. 1, 1891	....	200 00	200 00
Three small islands, Ottawa River	20	May 1, 1891	....	96 00	96 00
Covering over portion of Ottawa slides	21	Nov. 10, 1904	1 00	....	1 00
East portion of Hawley's Island	22	June 30, 1891	....	380 00	380 00
Piece of land, south-west end of Union Bridge	23	Nov. 12, 1904	150 00	75 00	225 00
Piece of land on Victoria Island	24	June 15, 1905	....	65 00	65 00
Piece of land, south side of Middle St., Victoria Island	25	Aug. 31, 1904	50 00	....	50 00
Piece of land, Longue Pointe Rouge Templeton, Ottawa County	26	Oct. 24, 1904	1 00	....	1 00
South-west of lot No. 1, Amelia Island	27	" 9, 1903	100 00	....	100 00
Lot Pa, South Head St	28	Jan. 10, 1905	10 00	....	10 00
Small lot near Custom House, Quebec	1	Sept. 1, 1904	1 00	....	1 00
Roadway from pier at Côteau Landing	2	July 1, 1904	....	150 00	150 00
Old Provincial Government Building grounds, on Mountain Hill	3	June 25, 1905	1 00	....	1 00
Privilege to erect bridge on St. Charles River	4	Feb. 6, 1905	1 00	....	1 00
Piece of land at North Beach	5	June 30, 1903	5 00	....	5 00
Use of old log house formerly used as Custom House, Shrewsbury, Ont.	6	Sept. 11, 1903	1 00	....	1 00
Use of breakwater for storing coal	7	Feb. 6, 1905	....	1 00	1 00
South-east half of lot 8, Ottawa	8	Dec. 18, 1904	1 00	....	1 00
Right of way over strip of land	9	Apl. 27, 1905	1 00	....	1 00
Lot of land on St. Christopher Island, St. Maurice River	10	Dec. 1, 1904	1 00	....	1 00
Outlet of River St. Maurice	11	June 30, 1904	100 00	100 00	200 00
Portion of Assay Office, New Westminster	12	" 11, 1891	....	165 00	165 00
" " "	13	" 11, 1891	....	90 00	90 00
Privilege to erect two bulkheads, Rock Bay, Victoria Harbour	14	" 1, 1905	100 00	....	100 00
Privilege to build a wharf opposite his own property, Victoria Harbour	15	" 1, 1905	....	50 00	50 00
Right of drainage through Government property, Nanaimo	16	Dec. 1, 1904	1 00	....	1 00
Old Government House, Yale	17	July 24, 1903	1 00	....	1 00
Beach lots A, C, E and F, front of 7, 8 and 9, Nanaimo Harbour	18	Aug. 27, 1904	12 00	....	12 00
Frontage on lot 7, block M, Victoria	19	July 16, 1903	....	5 00	5 00
Permission to build a wharf on lot A, block 2, Sumas River, Alberni, B.C	20	Aug. 12, 1904	....	10 00	10 00
Portion of Custom House lot, New Westminster	21	Apl. 14, 1905	1 00	....	1 00

DR. No. 35.—HYDRAULIC and other Rents, &c.,

Balances due on July 1, 1903.	Rents accrued up to June 30, 1904.	Totals.	Number.	Location.	Original Lessees.	Present Occupants.
$ cts.	$ cts.	$ cts.				
	50 00	50 00	22	British Columbia..	John Reid	
70 00		70 00	23	Rivière du Lièvre.	Dominion Phosphate Co., Ltd	
1 00		1 00	24	Charlottetown	Rt. Rev. Bishop McIntyre	Rt. Rev. Bishop McDonald.
	16 00	16 00	25	Antigonish, N.S.	L. C. Archibald	
	1 00	1 00	26	Owen Sound	Grand Trunk Railway	
	5 00	5 00	27		Jacob Duke Speers	
240 00		240 00	28	Windsor	Archie McNee	
	1 00	1 00	29	Lévis, Que	Cyrille Robitaille	
	5 00	5 00	30	Bayfield, N.S.	Charles L. Gass	
	1 00	1 00	31	"	"	
	5 00	5 00	32	Village of Brooke, Ont	Pedwell, William	
2,801 84	3,647 00	6,448 84				

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

SESSIONAL PAPER No. 12

Lessees' Accounts, 1903–1904—*Concluded.* CR.

Description of Property.	Number.	Date to which Account is made up.	Paid during Fiscal Year.	Balances due on June 30, 1904.	Totals.
			$ cts.	$ cts.	$ cts.
Lot 1, block 13, corner Begbie and Columbia Sts., New Westminster	22	May 12, 1905	50 00		50 00
Permission to erect a landing at Little Rapids, Rivière du Lievre	23	Apl. 30, 1898		70 00	70 00
Leave to connect drain to main service of public building	24	May 16, 1902		1 00	1 00
Tract of land and water lot, McNair's Cove	25	Dec. 30, 1904	16 00		16 00
Lot of land west of Sydenham River	26	" 31, 1904	1 00		1 00
Water lot	27	Apl. 8, 1905	5 00		5 00
Lot on Ouellette St., Windsor, Ont	28	" 30, 1900		240 00	240 00
Ground rent	29	" 4, 1905	1 00		1 00
Water lot	30	Dec. 7, 1904	5 00		5 00
"	31	June 8, 1905	1 00		1 00
"	32	Mar. 31, 1905	5 00		5 00
Grand Totals			3,658 00	2,790 84	6,448 84

W. J. GERALD,
Deputy Minister.

APPENDIX

No. 35 (A).—Hydraulic and other Rents, &c.—

Balances due on July 1, 1903.	Totals.	Number.	Location.	Name of Proprietors.
$ cts.	$ cts.			Land Sales—Principal Account.
12,092 83	12,092 83	1	Hamilton and Port Dover Road	Choat & Kern
433 34	433 34	2	Bonner's property, Quebec	Timothy Sullivan, now M. Murphy
333 34	333 34	3		John Bailey, now Alex. Powell
300 00	300 00	4		Abraham Thompson
147 80	147 80	5		John Boomer
248 40	248 40	6		John Garbatz, now J. C. Nolan
154 80	154 80	7		N. H. Brown
600 00	600 00	8		Estate Robert Reid
333 33	333 33	9		John Chevalier
533 33	533 33	10		Daniel Holden
333 33	333 33	11		George Creeley
63 00	63 00	12		Thomas McAdam
15,573 50	15,573 50			Land Sales—Interest Account.
6,298 25	6,298 25	1	Hamilton and Port Dover Road	Choat & Kern (matured)
558 00	558 00	2	Bonner's property, Quebec	Timothy Sullivan, now M. Murphy
120 00	120 00	3		John Bailey, now Alex. Powell
306 00	306 00	4		Abraham Thompson
155 22	155 22	5		John Boomer
275 82	275 82	6		John Garbatz, now J. C. Nolan
208 95	208 95	7		N. H. Bowen
828 00	828 00	8		Estate Robert Reid
190 00	190 00	9		John Chevalier
298 68	298 68	10		Daniel Holden
35 91	35 91	11		George Creeley
100 00	100 00	12		Thomas McAdam
100 00	100 00	13		Joseph Brook, tenant
9,474 83	9,474 83			

Inland Revenue Department,
Ottawa, August 19, 1904.

SESSIONAL PAPER No. 12

A—*Concluded.*

LESSEES' Accounts, 1903-1904.—*Concluded.*

Description of Property.	Number.	Date to which the account is made up.	Balances due on June 30, 1904.	Totals.
			$ cts.	$ cts.
Hamilton and Port Dover & Caledonia Bridge	1		12,092 83	12,092 83
Lot No. 1, Wolfe Street	2		433 44	433 34
" 9 "	3		333 34	333 34
" 49 "	4		306 00	306 00
" 73 and 74, Tower Street	5		147 80	147 80
" 64 Wolfe Street and 211 and 252 Ware Street	6		248 40	248 40
" 67 and 68, Monument Street	7		154 80	154 80
" 22 and 23, Wolfe Street	8		600 00	600 00
" 32, Wolfe Street	9		333 33	333 33
" 65 and 66, Wolfe Street	10		533 33	533 33
" 31, Wolfe Street	11		333 33	333 33
" 135, Church Street	12		63 00	63 00
			15,573 50	15,573 50
	1	June 30, 1874	6,298 25	6,298 25
Lot No. 1, Wolfe Street	2	May 1, 1889	558 00	558 00
" 9 "	3	"	120 00	120 00
" 49 "	4	"	306 00	306 00
" 73 and 74, Tower Street	5	"	155 22	155 22
" 64 Wolfe Street and 211 and 252 Ware Street	6	"	275 82	275 82
" 67 and 68, Monument Street	7	"	208 95	208 95
" 22 and 23, Wolfe Street	8	"	828 00	828 00
" 32, Wolfe Street	9	Nov. 1, 1863	190 00	190 00
" 65 and 66, Wolfe Street	10	"	298 68	298 68
" 31, Wolfe Street	11	"	35 91	35 91
" 135, Church Street	12	"	100 00	100 00
Monument Hotel	13	"	100 00	100 00
			9,474 83	9,474 83

W. J. GERALD
Deputy Minister.

APPENDIX B.

No. 1.—Details of Excise Expenditures for the Year ended June 30, 1904.

To whom paid.	Service.	Deductions for Retirement.	Deductions for Superannuation.	Deductions for Guarantee.	Amounts paid.	Total amounts paid.
	Belleville.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Iler, B.	Salary as Collector for year	.....	38 88	7 20	1,898 88	
Standish, J. G.	" Special Class Exciseman for year	.....	31 96	4 32	1,563 72	
Pole, C. W.	" Deputy Collector, Class A, for year	.....	29 94	3 60	1,466 40	
McCoy, W.	" Special Class Exciseman for year	.....	24 96	4 32	1,220 70	
McCuaig, A. F.	" Deputy Collector, Class B, for year	.....	18 00	2 88	879 12	
McFee, A. C.	" 1st Class Exciseman for year	.....	31 92	2 88	877 68	
Brown, W. J.	" " " "	13 68	.....	2 88	828 42	
	Salaries	43 68	175 66	28 08	8,734 92	
	Contingencies	.....	.....	.....	380 58	
						9,115 50
	Brantford.					
Sinon, E. H.	Salary as Collector for year	.....	31 86	7 20	1,557 12	
Sloan, W.	" Deputy Collector, Class A, for year	61 26	.....	3 60	1,160 76	
Weyms, C.	" 1st Class Exciseman for year	.....	20 46	2 88	1,001 64	
Hawkins, A. C.	" 1st " "	.....	19 96	2 88	977 16	
Orr, H. N.	" 1st " "	.....	35 04	2 88	964 56	
Hart, P. D.	" 2nd " from July 1, 1903, to Feb. 1, 1904.	.....	7 05	1 20	303 40	
Berry, H. L.	" 1st Class Exciseman from July 1, 1903, to January 1, 1904. Transferred to Windsor	22 26	.....	1 44	422 52	
	Salaries	83 52	114 37	22 08	6,387 16	
	Contingencies	.....	.....	.....	1,203 29	
						7,590 45
	Cornwall.					
Mulhern, M. M.	Salary as Collector for year	.....	20 34	3 60	996 00	
	Salary	.....	20 34	3 60	996 00	
	Contingencies	.....	.....	.....	92 30	
						1,088 30
	Guelph.					
Powell, J. B.	Salary as Collector for year	.....	43 26	7 20	2,114 52	
Till, T. M.	" Deputy Collector, Class A, for year	.....	30 66	3 60	1,500 72	
Dawson, W.	" Special Class Exciseman for year	.....	31 96	4 32	1,563 72	
Woodward, G. W.	" Special Class Exciseman for year	.....	24 96	4 32	1,220 70	
Broadfoot, S.	" Accountant	.....	23 94	4 32	1,146 96	
Bish, P.	" 1st Class Exciseman for year	.....	20 46	2 88	1,001 64	
Spence, F. H.	" 1st " "	.....	20 46	2 88	1,001 64	
Bowman, A.	" 1st " "	.....	20 46	2 88	1,001 64	
O'Donohue, M. J.	" 1st " "	.....	20 46	2 88	1,001 64	
Kilroy, E. T.	" 1st " "	.....	20 46	2 88	1,001 64	
Brain, A. F.	" 1st " "	.....	35 40	2 88	975 42	
O'Brien, E. C.	" 2nd " "	.....	17 34	2 88	850 98	
Alteman, P. J.	" 1st " "	.....	33 06	2 88	910 26	
Howie, A.	" 3rd " "	.....	15 30	2 88	746 82	
Coutts, J. J.	" 1st " "	43 68	.....	2 88	828 42	
	Salaries	43 68	358 18	52 56	16,866 72	
	Contingencies	.....	.....	.....	1,012 12	
						17,878 84

APPENDIX B.—No. 1.—DETAILS of Excise Expenditures, 1903-1904.—*Continued.*

To whom paid.	Service.	Deductions for Retirement.	Deductions for Superannuation.	Deductions for Guarantee	Amounts paid.	Total amounts paid.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
	Hamilton.					
Miller, W. F.	Salary as Collector for year		44 94	14 40	2,190 60	
Cameron, D. M.	" Special Class Exciseman for year		30 00	4 32	1,465 68	
Baby, W. A. D.	" "		31 96	4 32	1,563 72	
Donaghy, W.	" "		28 04	4 32	1,367 64	
O'Brien, Jas.	" Deputy Collector, Class A, for year	72 84		7 20	1,376 82	
Crawford, W. P.	" Accountant, for year		26 52	4 32	1,299 12	
O'Brien, J. F.	" 1st class exciseman for year		20 46	2 88	1,001 64	
Irwin, R.	" 1st " "		20 46	2 88	1,001 64	
Dumbrille, R. W.	" 1st " "		20 46	2 88	1,001 64	
Hobbs, G. N.	" 1st " "		20 46	2 88	1,001 64	
Wardell, R. S. R.	" 1st class exciseman from July 1, 1903, to April 1, 1904. Transferred to Toronto		26 64	2 16	733 68	
Brennan, D. J.	" 1st class exciseman for year		20 46	2 88	1,001 64	
Hayhurst, T. H.	" 1st " "	48 30		2 88	916 26	
Logan, J.	" 2nd " "		17 34	2 88	850 98	
Amor, W.	" 2nd " "		17 34	2 88	850 98	
Bishop, J. B.	" 2nd " "	39 96		2 88	757 14	
Cheseldine, J. H.	" 1st " "	43 68		2 88	828 42	
Lawlor, J. J.	" 1st " "	43 68		2 88	828 42	
Blackman, C.	" Messenger	29 48			560 52	
Boyd, J. F. S.	" 1st class exciseman from April 1 to June 30, 1904. Brought from Toronto		8 73	0 72	240 54	
	Salaries	277 94	333 81	73 44	20,838 72	
	Contingencies				669 47	
						21,508 19
	Kingston.					
Dickson, C. T.	Salary as Collector for year		15 96	7 20	1,616 82	
Grimason, T.	" Deputy Collector for year		24 54	3 60	1,199 34	
Hanley, A.	" Accountant for year		19 96	2 88	977 16	
McFarland, C. D.	" 1st class exciseman for year		6 80	0 99	323 86	
Lyons, E.	" 1st " "		20 46	2 88	1,001 64	
O'Donnell, J.	" Messenger for year		15 30	2 88	746 82	
Fahey, E.	" 3rd class exciseman for year		14 40	2 88	702 72	
Hogan, Jas.	" 3rd class exciseman from July 28, 1903, to June 30, 1904	25 30		2 67	478 42	
	Salaries	25 30	117 42	25 98	7,056 78	
	Contingencies				1,316 91	
						8,373 69
	London.					
Alexander, T.	Salary as Collector for year		43 26	7 20	2,114 52	
Spereman, J. J.	" Special Class exciseman for year		31 96	4 32	1,563 72	
Davis, T. G.	" Deputy Collector, Class A, for year		30 72	3 60	1,503 18	
Thrasher, W. A.	" Deputy Collector, Class A, for year	76 86		3 60	1,457 04	
Coles, F. H.	" Accountant for year		23 94	4 32	1,146 96	
Wilson, D.	" " "		21 00	2 88	1,026 12	
Hicks, W. H.	" Deputy Collector, Class B, from July 1, 1903, to March 1, 1904. Removed to Stratford		13 28	1 92	651 44	
Stewart, J.	" 1st class exciseman for year		20 46	2 88	1,001 64	
Lee, E.	" 1st " "		20 46	2 88	1,001 64	

APPENDIX B.—No. 1.—DETAILS of Excise Expenditures, 1903-1904.—*Continued.*

To whom paid.	Service	Deductions for Retirement.	Deductions for Superannuation.	Deductions for Guarantee	Amounts paid.	Total amounts paid.
	London—Con.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Girard, J.	Salary as 1st class exciseman for year	.....	20 46	2 88	1,001 64	
Boyle, P.	" 1st " "	(Ins.) 71 76	30 66	2 88	919 68	
Davis, Jas	" 1st " "		19 62	2 88	960 90	
Foster H.	" 1st " "	.....	33 78	2 88	930 78	
Webbe, C. E. A.	" 2nd " "	.....	17 34	2 88	850 98	
Tracy, J. P.	" 2nd " "	.....	17 34	2 88	850 98	
Talbot, J.	" 3rd " "	37 44	.....	2 88	709 68	
Whitehead, J. P.	" Deputy Collector, Class B, for year	32 40	.....	2 88	614 64	
Fiddes, Jas.	" Deputy Collector, Class B, from December 2, 1903, to June 30, 1904	14 49	.....	1 67	274 12	
Rose, J. A.	" Deputy Collector, Class B, from April 16, 1904, to June 30, 1904	13 52	.....	0 75	256 55	
	Salaries	246 47	344 28	59 06	18,836 21	
	Contingencies	.....	.....	.....	1,223 46	20,059 67
	Ottawa.					
Freeland, A.	Salary as Collector for year	78 42	.....	7 20	1,484 34	
McGuire, T.	" Deputy Collector, Class A, for year	61 32	.....	3 60	1,162 56	
Slattery, R.	" 1st class exciseman for year	.. .	20 46	2 88	1,001 64	
Fox, T.	" " " "	.....	20 46	2 88	1,601 64	
Bennett, Jas.	" Deputy Collector, Class B, for year	45 00	.....	2 88	852 12	
Hinchey, E. H.	" Accountant for year	.....	18 70	4 32	913 74	
Laporte, G.	" Deputy Collector, Class B, for year	..	16 96	2 88	830 16	
Casey, J.	" Probationary 3rd Class from 1st July to 30th Sept., 1903, and 3rd Class from 1st Oct. 1903, to June 30, 1904	28 74	.....	2 88	543 36	
Wiallard, R. A.	" Deputy Collector, Class B, from 11th April, 1904, to 30th June, 1904	6 66	.....	.....	126 67	
	Salaries	220 14	76 58	29 52	7,916 23	
	Contingencies	.....	.....	.....	194 89	8,111 12
	Owen Sound.					
Graham, W. J.	Salary as Collector for year	.....	9 20	3 60	1,377 16	
Nichols, J. T.	" Deputy Collector, Class B, for year	.....	19 96	2 88	977 16	
Johnson, J. J.	" 1st class exciseman, for year	.. ..	19 68	2 88	966 12	
Chisholm, W. N.	" Deputy Collector, Class A, for year	.....	19 38	3 60	946 98	
Blyth, A.	" 2nd class exciseman, for year	45 54	.....	2 88	864 06	
	Salaries	45 54	68 22	15 84	5,131 48	
	Contingencies	.....	.....	.....	618 02	5,749 50
	Perth.					
McLenaghan, N.	Salary as Collector for year	71 70	.....	7 20	1,356 06	
Mason, F.	" Special Class exciseman for year	.....	30 96	4 32	1,514 70	

SESSIONAL PAPER No. 12

APPENDIX B.—No. 1.—DETAILS of Excise Expenditures, 1903–1904.—*Continued.*

To whom paid.	Service.	Deductions for			Amounts paid.	Total amounts paid.
		Retirement.	Superannuation.	Guarantee		
	Perth—Con.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Goodman, A. W.	Salary as 1st class exciseman for year	.....	20 46	2 88	1,001 64	
Noonan, H. T	" Deputy Collector, Class A, for year	36 72	.....	3 60	694 68	
Clarke, T	" Deputy Collector, Class B, for year	40 04	.....	2 88	757 08	
Rowan, W. E	" " "	25 04	.....	2 88	472 08	
Egan, W	" " "	.....	.....	2 88	397 08	
Baikie, D	" " "	25 04	.....	3 60	471 36	
George, J	" " "	10 04	.....	2 88	187 08	
Maurice, E	" " "	15 00	.....	2 88	282 12	
Murphy, Jas. L	" " "	5 02	.....	2 88	92 10	
	Salaries	228 60	51 42	38 88	7,225 98	
	Contingencies	.....	.....	.....	599 99	
						7,825 97
	Peterborough.					
Rudkins, W	Salary as Collector for year	58 14	.....	3 60	1,100 76	
Rork, T	" Deputy Collector, Class A, for year	43 96	.....	3 60	832 44	
Howden, R	" Deputy Collector, Class B, for year	.....	16 04	2 88	781 08	
Bickle, J. W	" " "	.....	13 96	2 88	683 16	
	Salaries	102 10	30 00	12 96	3,397 44	
	Contingencies	.....	.....	.....	212 38	
						3,609 82
	Port Arthur.					
Ironside, G. A	Salary as Collector for year	.....	20 34	3 60	996 00	
Sangster, F. H	" Deputy Collector from July 13, 1903, to June 30, 1904	7 20	.....	2 79	135 17	
	Salaries	7 20	20 34	6 39	1,131 17	
	Contingencies	.....	.....	.....	215 49	
						1,346 66
	Prescott.					
Keilty, T	Salary as Collector for year	.....	33 96	7 20	1,658 82	
Gerald, W. H	" Special Class Exciseman for year	.....	31 96	4 32	1,563 72	
Macdonald, A. B	" " "	.....	24 96	4 32	1,220 70	
Melville, T. R	" Deputy Collector, Class A, for year	62 46	.....	3 60	1,183 92	
Keeler, G. S	" 2nd Class Exciseman for year	.....	17 34	2 88	850 98	
Wood, J. A	" Deputy Collector, Class B, for year	.....	.....	2 88	847 08	
Johnston, G. E	" 3rd Class Exciseman from July 1 to October 31, 1904	.....	5 00	0 96	244 04	
White, J. B	" Deputy Collector, Class B, for year	32 48	.....	2 88	614 64	
Marshall, N	" 3rd Class Exciseman for year	30 72	.....	2 88	581 40	
Whelan, T. E	" Probationary 3rd Class from Dec. 17, 1903, to June 30, 1904	13 48	.....	1 55	255 08	
McPherson, E. A	" Probationary 3rd Class from Dec. 28, 1903, to June 30, 1904	12 75	.....	1 44	241 14	
	Salaries	151 89	113 22	34 91	9,261 52	
	Contingencies	.....	.....	.....	804 14	
						10,065 66

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1903-1904.—*Continued.*

To whom paid.	Service.	Deductions for Retirement.	Deductions for Superannuation.	Deductions for Guarantee.	Amounts paid.	Total amounts paid.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
	St. Catharines.					
Hesson, C. A.	Salary as Collector for year	.....	24 60	7 20	1,198 20	
Harris, J. G.	" Deputy Collector for year	....	34 96	2 88	962 16	
Milliken, E.	" 2nd Class Exciseman for year	.....	17 34	2 88	850 98	
Schram, R. L. H.	" 3rd " " "	.....	27 90	2 88	769 20	
Simpson, W. A.	" 3rd " " "	37 50	.....	2 88	710 82	
	Salaries	37 50	104 80	18 72	4,491 36	
	Contingencies				376 45	4,867 81
	Stratford.					
Rennie, Geo.	Salary as Collector for year	.....	29 84	7 20	1,458 06	
Tobin, T. S.	" Deputy Collector, Class A, for year	52 74	.....	3 45	999 38	
Clarke, A. F.	" Accountant from July 1, to October 12, 1903	...	5 57	1 20	272 78	
Egener, A.	" 1st Class Exciseman for year	..	20 46	2 88	1,001 64	
Waller, J.	" 3rd Class Exciseman from July 1, 1903, to Mar. 1, 1904	....	10 10	1 92	492 98	
Young, R. E.	" 1st Class Exciseman for year	43 68	...	2 88	828 42	
Jeffrey, A. J.	" Deputy Collector, Class B, from Jan. 11 to June 30, 1904	18 90	.....	1 44	358 11	
Hicks, W. H.	" Deputy Collector, Class B, from Mar. 1 to June 30, 1904. Brought from London	....	6 64	0 96	325 72	
	Salaries	115 32	72 61	21 93	5,737 09	
	Contingencies				1,037 89	6,774 98
	Toronto.					
Frankland, H. R.	Salary as Collector for year	105 96	.....	14 40	1,999 62	
Gerald, C.	" Special Class Exciseman for year	..	32 94	4 32	1,612 68	
Henderson, W.	" Deputy Collector, Class A, for year	.	30 72	3 60	1,503 18	
Boomer, J. B.	" Accountant for year	.....	28 56	4 32	1,397 04	
Mackenzie, J. H.	" Deputy Collector, Class A, for year	71 58	.....	3 60	1,357 32	
Metcalf, W. F.	" Special Class Exciseman for year	....	24 96	4 32	1,220 70	
Boyd, S. I.	" Deputy Collector, Class B, for year	.....	24 00	2 88	1,173 12	
Dick, J. W.	" Special Class Exciseman for year	....	24 96	4 32	1,220 70	
Evans, G. T.	" Special Class Exciseman for year	.....	24 96	4 32	1,220 70	
Jamieson, R. C.	" Special Class Exciseman for year	.....	24 96	4 32	1,220 70	
Shanacy, M.	" Deputy Collector, Class B, for year	.....	22 04	2 88	1,075 08	
Dudley, W. H.	" 1st Class Exciseman for year	.....	20 46	4 32	1,000 20	
Coleman, C.	" Deputy Collector, Class B, for year	.	19 96	2 88	977 16	
Helliwell, H. N.	" 1st Class Exciseman for year	....	20 46	2 88	1,001 64	
O'Leary, J. J.	" 1st " " "	.....	20 46	2 88	1,001 64	
Flynn, D. J.	" 1st " " " from July 1 to Aug. 27, 1903, and Special Class from Aug. 28, 1903, to June 30, 1904	.....	23 36	4 08	1,141 36	

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APPENDIX B.—No. 1.—Details of Excise Expenditures, 1903-1904. *Continued.*

To whom paid.	Service.	Deductions for Retirement.	Deductions for Superannuation.	Deductions for Guarantee.	Amounts paid.	Total amounts paid.
	Toronto—Con.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Graham, W. T.	Salary as 1st Class Exciseman for year		20 46	2 88	1,001 64	
Doyle, B. J.	" 1st " " "		20 46	2 88	1,001 64	
Weir, J.	" 1st " " " from July 1, 1903, to Jan. 1, 1904; resigned		9 96	1 44	488 58	
Cook, W. R.	" 1st Class Exciseman for year		20 46	2 88	1,001 64	
Howard, W. W. S.	" 1st " " "		20 46	2 88	1,001 64	
Hurst, L. B.	" 1st " " "		20 46	2 88	1,001 64	
Barber, J. S.	" 2nd " " "		17 34	2 88	850 98	
Murray, A. E.	" 2nd " " "		17 34	2 88	850 98	
Dager, H. J.	" Deputy Collector, Class B, for year	45 00		2 88	852 12	
Brentnall, F. F.	" Deputy Collector, Class B, for year	42 52		2 88	804 60	
Boyd, J. F. S.	" 1st Class Exciseman from July 1, 1903, to April 1, 1904; removed to Hamilton		23 55	2 16	649 26	
Coulter, A.	" 1st Class Exciseman for year		32 28	2 88	889 80	
Ritchie, H.	" Deputy Collector, Class B, for year	40 04		2 88	757 08	
Jones, A.	" 3rd Class Exciseman for year		15 30	2 88	746 82	
Falconer, R. H.	" 1st " " "	43 68		2 88	828 42	
Graham, A. L.	" 1st " " "	43 68		2 88	828 42	
Burns, R. J.	" 2nd " " "	43 68		2 88	828 42	
Mahoney, H.	" 1st " " "	43 68		2 88	828 42	
Gillies, A. L.	" 3rd " " " from Jan. 1 to June 30, 1904	27 48		2 88		
Elliott, T. H.	" Deputy Collector, Class B, for year	46 20		2 88	519 60	
	(Insurance)	31 32			844 53	
Walsh, W. H.	" Probationary 3rd Class from Oct. 14, 1903, to April 13, 1904, and 3rd Class from Apl. 14 to June 30, 1904	18 92		2 05	357 90	
Fielding, L. G.	" Stenographer and typewriter from Jan. 1 to June 30, 1904	9 96			190 02	
Wardell, R. S. R.	" 1st Class Exciseman, April 1 to June 30, 1904, brought from Hamilton		9 18	0 72	252 60	
	Salaries	613 70	570 05	128 53	37,499 59	
	Contingencies				1,605 71	
						39,105 30
	Windsor.					
McSween, Jas.	Salary as Collector for year		38 88	14 40	1,891 68	
Bouteiller, G. A.	" Special Class Exciseman for year		32 94	4 32	1,612 68	
Marion, H. R.	" Deputy Collector, Class A, for year	71 58		7 20	1,353 72	
Dunlop, C.	" Deputy Collector, Class B, for year		25 96	3 60	1,270 44	
Gow, J. E.	" Special Class Exciseman for year		24 96	4 32	1,220 70	
Brennan, J.	" Special Class Exciseman for year		24 96	4 32	1,220 70	
Allen, G. A.	" Special Class Exciseman from July 1, to Oct. 1, 1903; removed to St. Hyacinthe		6 00	1 08	292 92	
Belleperche, A. J. E.	" Accountant for year	57 48		4 32	1,088 16	
Marcon, F. A.	" 1st Class Exciseman for year		20 46	2 88	1,001 64	
Keogh, P. M.	" Deputy Collector, Class B, for year		19 96	3 60	976 44	

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1903-1904.—*Continued.*

To whom paid.	Service.	Deductions for			Amounts paid.	Total amounts paid.
		Retirement.	Superannuation.	Guarantee.		
	Windsor—Con.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Thomas, R.	Salary as 1st Class Exciseman for year		20 46	2 88	1,001 64	
Bayard, G. A.	" 1st " "		20 46	2 88	1,001 64	
Jubenville, J. P.	" 2nd " "		17 34	2 88	850 98	
Falconer, J.	" 3rd " "		15 30	2 88	746 82	
Cahill, J. W.	" 3rd " "		15 30	2 88	746 82	
Neil, Jas.	" 1st " "	43 68		2 88	828 42	
Chilver, F. W.	" 1st " "	43 68		2 88	828 42	
McArthur, G. H.	" 1st " "	43 68		2 88	828 42	
Beneteau, S.	" 2nd " "	30 72		2 88	581 40	
Berry, H. L.	" 1st " " from Jan. 1, to June 30, 1904; brought from Brantford	24 96		1 44	473 58	
Adam, A. R.	" 3rd Class Exciseman from Jan. 1, to June 30, 1904	15 90		1 44	283 56	
	Salaries	330 78	282 98	78 84	20,100 78	
	Contingencies				992 45	
						21,093 23
	Joliette.					
Labelle, L. V.	Salary as Collector for year	76 68		3 60	1,454 70	
Taylor, G. W.	" Special Class Exciseman for year		30 00	4 32	1,465 68	
Moreau, A.	" Deputy Collector, Class B	37 44		3 60	708 96	
Ralston, T.	" " "	34 96		3 60	661 44	
Ganache, J. N.	" " "	34 96		1 80	663 24	
Forest, M.	" " "	10 04		3 60	186 36	
Olivier, H.	" Probationary 3rd class from Jan. 1, to June 30, 1904	12 48		1 44	236 04	
Bourgeois, C.	" Messenger from Jan. 1 to June 30, 1904	9 96			190 02	
	Salaries	216 52	30 00	21 96	5,566 44	
	Contingencies				958 62	
						6,525 06
	Montreal.					
Toupin, J. A.	Salary as Collector for year		37 98	14 40	1,847 58	
Caven, W.	" Deputy Collector, Class A, for year		30 72	7 20	1,499 58	
Forest, E. R.	" Accountant for year		27 00	7 20	1,315 80	
Fox, J. D.	" " "		27 24	4 32	1,333 38	
Lane, T. M.	" " "		24 00	2 88	1,173 12	
Walsh, D. J.	" Special Class Exciseman for year		28 04	4 32	1,367 64	
Scullion, W. J.	" 1st Class Exciseman for year		20 46	2 88	1,001 64	
Normandin, G.	" " " "	49 96		3 60	946 44	
Chagnon, C. P.	" Deputy Collector for year	49 96		7 20	942 84	
Malo, T.	" 2nd Class Exciseman for year		17 34	2 88	850 98	
Dunnochel, L.	" 2nd " " "		17 34	2 88	850 98	
Courtney, J. J.	" 2nd " " "		17 34	2 88	850 98	
Verner, F.	" 1st " " "		17 34	2 88	850 98	
Dixon, H. J. S.	" 2nd " " "		17 34	2 88	850 98	
Andrews, A. A.	" 2nd " " "		30 12	2 88	837 90	
Cobb, H. J. S.	" 2nd " " "		17 34	2 88	850 98	
Renaud, A. H.	" 1st " " "		32 28	2 88	889 80	
Desaulniers, J. E. A.	" 1st " " "	45 54		2 88	864 06	
Laurier, J. L.	" 2nd " " "	41 82		2 88	792 78	
Snowden, J. W.	" 2nd " " "	46 20		2 88	875 88	
Millier, E.	" 2nd " " "		15 30	2 88	746 82	
Panneton, G. E.	" 3rd " " "		15 30	2 88	746 82	
Costigan, J. J.	" 3rd " " "		15 30	2 88	746 82	

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APPENDIX B.—No. 1.—Details of Excise Expenditures, 1903-1904.—*Continued.*

To whom paid.	Service.	Deductions for Retirement.	Deductions for Superannuation.	Deductions for Guarantee	Amounts paid.	Total amounts paid.
	Montreal—Con.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
O'Flaherty, E. J.	Salary as 3rd Class Exciseman for year.		15 30	2 88	746 82	
Brabant, J. B. G. N.	" 3rd " " "		15 96	2 88	781 14	
Bélair, A. P.	" 3rd " " "		15 30	2 88	746 82	
Ryan, W.	" 3rd " " "	38 22		2 88	723 90	
Mainville, C. P.	" 3rd " " "		15 30	2 88	746 82	
Daveluy, J. P.	" 3rd " " "	38 22		2 88	723 90	
Comte, L. A. A. J.	" 2nd " " "		27 78	2 88	765 54	
Kearney, D. J.	" 1st " " "	43 68		2 88	828 42	
Bousquet, J. O.	" 1st " " "	43 68		2 88	828 42	
Lambert, J. A.	" 2nd " " "	39 96		2 88	757 14	
Maranda, N. A.	" 3rd " " "	33 00		2 88	624 12	
David, T.	" 2nd " " "	37 74		2 88	714 36	
Harwood, J. O. A.	" 2nd " " "	37 50		2 88	710 82	
Fortier, V.	" Deputy Collector, Class B, from July 1 to October 1, 1903.	8 73		0 90	165 36	
Bruyère, H. P.	" Deputy Collector, Class B, for year.	32 48		3 60	613 92	
Patterson, C. E. A.	" Deputy Collector, Class B, for year.	34 96		3 60	661 44	
Marin, L. H.	" 3rd Class Exciseman for year.	31 26		2 88	592 08	
Gauvin, E.	" 2nd " " "	39 96		2 88	757 14	
Bernard, N. J. D.	" 2nd " " " from July 1, 1903, to Jan. 1, 1904. Transferred to St. Hyacinthe.	15 54		1 44	294 24	
Bernier, J. A.	" 1st Class Exciseman for year.	43 68		2 88	828 42	
St. Michel, F. X.	" Deputy Collector, Class B, for year	25 04		3 60	471 36	
O'Donnell, M. J.	" Messenger for year	28 04			531 96	
Lamoureux, J. A.	" Probationary 3rd Class from July 1, to Dec. 5, 1903, and 3rd Class from Dec. 6, 1903 to June 30, 1904	27 83		2 88	526 23	
Blais, J. C. F.	" " "	27 90		2 88	527 52	
Crevier, J. H.	" Probationary 3rd Class from Dec. 29, 1903, to June 30, 1904	12 68		1 44	239 87	
Ledoux, A.	" Stenographer and typewriter from Jan. 1 to June 30, 1904	9 96		1 44	188 58	
Longtin, H.	" Probationary 3rd Class from Mar. 14 to June 30, 1904	7 44		0 85	140 87	
	Salaries	890 98	497 72	163 03	39,271 99	
	Contingencies				4,528 48	
						43,800 12
	Quebec.					
LaRue, Geo.	Salary as Collector for year		43 26	7 20	2,114 52	
Cahill, J. H.	" Deputy Collector, Class A, for year			3 60	1,531 38	
Patry, J. H.	" " "	71 58		3 60	1,357 32	
Coleman, J. J.	" 1st Class Exciseman for year		20 46	2 88	1,001 64	
LaRue, A.	" Deputy Collector, Class B, for year.		31 44	3 60	864 96	
Bourget, O.	" Unclassified Exciseman for year.		16 96	2 88	830 16	
Lemoine, J.	" 3rd Class Exciseman for year.		15 30	2 88	746 82	
Lépine, L.	" " "		15 30	2 88	746 82	
Bourassa, J.	" " "		26 70	2 88	735 42	
LaRue, A. P.	" Deputy Collector, Class B, for year.	37 44		3 60	708 96	
Beaulieu, J. B.	" 3rd Class Exciseman for year.		25 98	2 88	713 64	
Timmons, P.	" from July 1, to Sept. 15, 1903.		6 48	0 60	178 53	

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1903-1904.—*Continued.*

To whom paid.	Service.	Deductions for Retirement.	Deductions for Superannuation.	Deductions for Guarantee	Amounts paid.	Total amounts paid.
	Quebec—Con.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Pelletier, N. G.	Salary as Deputy Collector, Class B, for year	25 04	.....	3 60	471 36	
Michon, A. E.	" " "	4 96	.....	1 80	93 24	
Timmons, R.	" 3rd Class Exciseman from Oct. 12, 1903, to June 30, 1904	19 08	.....	2 08	360 95	
McGuire, L. J.	" Probationary Exciseman from Feb. 23, to April 11, 1904, and 3rd Class Exciseman from April 12 to June 30, 1904	8 82	.....	0 96	166 91	
Courchesne, J. H.	" Deputy Collector, Class B, from March 19 to June 30, 1904	1 40	.....	0 51	26 57	
	Salaries	168 32	201 88	48 43	12,649 20	
	Contingencies	.....	.....	.....	5,260 64	
						17,909 84
	Sherbrooke.					
Simpson, A. F.	Salary as Collector for year	.....	32 76	7 20	1,600 02	
Quinn, J. D.	" Special Class Exciseman for year	.....	24 96	4 32	1,220 70	
Chartier, E.	" Deputy Collector, Class A, for year	61 32	.....	3 60	1,162 56	
Bowen, F. C.	" 3rd Class Exciseman for year	38 22	.....	2 88	723 90	
de Grosbois, C. B.	" " "	33 72	.....	2 88	638 40	
Rousseau, E. H.	" Deputy Collector, Class B, for year	32 48	.....	3 60	613 92	
	Salaries	165 74	57 72	24 48	5,959 50	
	Contingencies	.....	.....	.....	762 21	
						6,721 71
	St. Hyacinthe.					
Benoit, L. V.	Salary as Collector for year	67 98	.....	7 20	1,284 78	
Murray, D.	" 1st Class Exciseman for year	.....	20 46	2 88	1,001 64	
Fortier, J. J. O.	" Deputy Collector, Class B, for year	.....	19 96	2 88	977 16	
Daignault, G.	" Deputy Collector Class A, from July 1, 1903, to May 1, 1904	35 00	.....	3 00	662 00	
Poirier, J. N.	" Deputy Collector, Class B, for year	.....	26 16	2 88	720 96	
Deland, A. N.	" " "	34 96	.....	3 60	661 44	
Dumaine, J. D.	" 3rd Class Exciseman for year	33 00	.....	2 88	624 12	
Roulean, J. C.	" " "	31 26	.....	2 88	592 08	
Tetreault, J.	" Deputy Collector, Class B, for year	4 96	.....	3 60	91 44	
Portelance, P. A.	" " "	4 96	.....	1 80	93 24	
Allen, G. A.	" Special Class Exciseman, Oct. 1, 1903, to June 30, 1904. Removed from Windsor	.....	19 98	3 24	976 74	
Bernard, N. J. D.	" 2nd Class Exciseman from Jan. 1 to June 30, 1904. Brought from Montreal	21 24	.....	1 44	402 30	
Langelier, F.	" Deputy Collector, Class B, from March 15 to June 30, 1904	11 81	.....	0 53	224 19	
Desmarais, H. F.	" Deputy Collector, Class B, from May 1 to June 30, 1904	0 83	.....	0 30	15 53	
	Salaries	246 00	86 56	39 11	8,327 62	
	Contingencies	.....	.....	.....	2,853 64	
						11,191 26

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1903-1904.—*Continued.*

To whom paid.	Service.	Deductions for			Amounts paid.	Total amounts paid.
		Retirement.	Superannuation.	Guarantee.		
	Three Rivers.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Hébert, G. D.	Salary as Collector for year	.....	24 60	3 60	1,201 80	
Duplessis, C. Z.	" Deputy Collector for year	.....	18 00	3 60	878 40	
Auger, L. H	" Probationary Exciseman from Feb. 23 to June 30, 1904	8 82	.....	0 96	166 91	
	Salaries	8 82	42 60	8 16	2,247 11	
	Contingencies				494 39	
						2,741 50
	St. John, N.B.					
Belyea, T. H.	Salary as Collector for year	.....	31 32	7 20	1,531 44	
Clarke, J. A	" Deputy Collector for year	.....	24 54	3 60	1,199 34	
McCloskey, J. R.	" 1st Class Exciseman for year	.....	20 46	2 88	1,001 64	
Fitzpatrick, J.	" " " "	.....	20 46	2 88	1,001 64	
Geldart, O. A.	" " " "	.....	20 46	2 88	1,001 64	
Harrison, W. F.	" Deputy Collector, Class B, for year	49 96	.....	3 60	946 44	
Ferguson, J. C.	" 1st Class Exciseman for year	.....	18 42	2 88	903 66	
Dibblee, W.	" Deputy Collector, Class B, for year	.....	3 72	2 88	293 40	
Dwyer, D. T.	" Deputy Collector, Class B, for year	10 04	.....	3 60	186 36	
	Salaries	60 00	139 38	32 40	8,065 56	
	Contingencies				889 74	
						8,955 30
	Halifax.					
Grant, H. H.	Salary as Collector for year	.....	36 90	7 20	1,800 90	
King, R. M.	" Deputy Collector, Class A, for year	.....	26 58	3 60	1,302 30	
James, T. C.	" Accountant	.....	20 46	4 32	1,000 20	
Carroll, D.	" 1st Class Exciseman for year	.....	20 46	2 88	1,001 64	
Blethen, C. W.	" " " "	.....	20 46	2 88	1,001 64	
Hubley, H. H	" " " "	.....	19 68	2 88	966 12	
Gorman, A. M.	" " " "	.....	18 84	2 88	924 48	
Wainwright, F. G.	" 2nd Class Exciseman "	.....	17 84	2 88	850 98	
Tompkins, P.	" 3rd " "	.....	15 30	2 88	746 82	
Hagarty, P.	" " "	.....	15 30	2 88	746 82	
Munro, H. D.	" " "	.....	15 30	2 88	746 82	
	Salaries	.....	226 62	38 16	11,088 72	
	Contingencies				430 35	
						11,519 07
	Picton.					
Fraser, P.	Salary as Collector for year	.....	20 34	3 60	996 00	
Macdonald, A. J.	" Deputy Collector, Class B, for year	37 44	.....	2 88	709 68	
Carroll, F. P.	" 3rd Class Exciseman for year	31 44	.....	2 88	595 68	
	Salaries	68 88	20 34	9 36	2,301 36	
	Contingencies	.....	.....	.....	381 80	
						2,683 16
	Charlottetown.					
Nash, S. C.	Salary as Collector for year	.....	24 60	3 60	1,201 80	
Moore, T.	" Deputy Collector, Class B, for year	.....	19 96	2 88	977 16	
	Salaries	.....	44 56	6 48	2,178 96	
	Contingencies	.....	.....	.....	91 24	
						2,270 20

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1903-1904.—*Continued.*

To whom paid.	Service.	Deductions for.			Amounts paid.	Total amount paid.
		Retirement.	Superannuation.	Guarantee.		
	Winnipeg.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Gosnell, T. S.	Salary as Collector for year		44 52	7 20	2,178 24	
Watson, W. W.	" Deputy Collector, Class A, for year			3 60	1,531 38	
Cole, A	Salary as Accountant for year		28 56	4 32	1,397 04	
Hawkins, W. L.	" " "		24 00	4 32	1,171 68	
Girdlestone, R. J. M.	" Deputy Collector, Class B, for year		19 96	2 88	977 16	
Verner, T. H.	Salary as 1st Class Exciseman for year		34 92	2 88	961 56	
LaRiviere, A. C.	" " " "		33 78	2 88	930 78	
Sparling, J. W.	" Deputy Collector, Class B, for year	42 52		2 88	804 60	
Conklin, W. M.	Salary as 1st Class Exciseman for year	47 22		2 88	896 10	
Long, W. H	" " " "	47 22		2 88	896 10	
Barnes, G.	" Deputy Collector, Class B, for year	30 00		2 88	567 12	
Gerow, W. M.	Salary as 3rd Class Exciseman for year	28 74		2 88	543 36	
Ross, H. E.	" Deputy Collector, Class B, for year		11 92	2 88	385 20	
Jameson, S. B.	Salary as Deputy Collector, Class B, for year		9 00	2 88	288 12	
McNiven, J. D.	Salary as Deputy Collector, Class B, for year	17 48		2 88	329 64	
Earl, R. W.	Salary as Probationary Exciseman for year	11 14		1 28	210 66	
	Salaries	224 32	206 66	52 40	14,668 74	
	Contingencies				3,536 39	
						17,605 13
	Calgary.					
Saucier, X.	Salary as Collector for year		28 04	3 60	1,368 36	
Fletcher, R. W.	" Deputy Collector, Class B, for year	40 04		2 88	757 08	
Osborne, F. A.	Salary as Deputy Collector, Class B, for year		21 00	2 88	576 12	
Walker, J. H.	Salary as Deputy Collector, Class B, for year	11 64		2 88	218 80	
Kenny, J.	Salary as Deputy Collector, Class B, from Nov. 1, 1903, to June 30, 1904	10 00		2 40	187 60	
	Salaries	61 68	49 04	14 64	3,107 96	
	Contingencies				2,505 27	
						5,613 23
	Vancouver.					
Miller, J. E.	Salary as Collector for year		32 46	7 20	1,585 32	
Parkinson, E. B.	Salary as Deputy Collector, Class A, for year	60 24		3 60	1,141 14	
McCraney, H. P.	Salary as Deputy Collector, Class B, for year	45 00		3 60	851 40	
Swannell, F. W.	Salary as Deputy Collector, Class B, for year	47 48		3 60	898 92	
Power, J. F.	Salary as 2nd Class Exciseman from July 1 to October 31, and Accountant from Nov. 1, 1903, to June 30, 1904	39 12		3 84	740 32	
Cargill, W.	Salary as Deputy Collector, Class B, for year	39 00		3 60	737 40	
Wolfenden, W.	Salary as Deputy Collector, Class B, for year	34 96		3 60	661 44	
Thorburn, J.	Salary as 3rd Class Exciseman	33 00		2 88	624 12	
McCutcheon, H. M.	" Deputy Collector, Class B, for year	30 00		3 60	566 40	

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1903-1904.—*Continued.*

To whom paid.	Service.	Deductions for			Amounts paid.	Total amounts paid.
		Retirement.	Superannuation.	Guarantee.		
	Vancouver—Con.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Hodder, W. E....	Salary as Deputy Collector, Class B, for year	30 00	.....	3 60	566 40	
Howell, T.....	Salary as Deputy Collector, Class B, for year	25 04	.....	3 60	471 36	
Stevens, D. B. ...	Salary as Deputy Collector, Class B, for year	19 96	.....	3 60	376 44	
Parsons, C. H....	Salary as Deputy Collector, Class B, for year	10 04	.....	3 60	186 36	
Keay, W. S.....	Salary as Deputy Collector from October 3, 1903, to June, 30, 1904 ...	14 83	.....	2 68	280 30	
	Salaries	428 67	32 46	52 60	9,687 32	
	Contingencies	...	.....	.....	3,503 98	
						13,191 30
	Victoria.					
Jones, R.....	Salary as Collector for year	..	33 18	7 20	1,619 58	
O'Sullivan, D. ...	" Deputy Collector, Class A, for year		42 12	3 60	1,159 26	
Henwood, G	Salary as 1st Class Exciseman for year	.....	20 46	2 88	1,001 64	
Ridgman, A. H...	" " " "	.....	33 06	2 88	910 26	
McAloney, J. A..	" Deputy Collector, Class B...	19 96	.....	3 60	376 44	
	Salaries	19 96	128 82	20 16	5,067 18	
	Contingencies	.....	.....	.....	711 14	
						5,778 32

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1903-1904.—*Continued.*

To whom paid.	Service.	Deductions for			Amounts paid.	Total amounts paid.
		Retirement.	Superannuation.	Guarantee, &c.		
	DISTRICT INSPECTORS.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
	Ontario.					
Dingman, N. J.	Salary for year		44 00	9 00	2,147 00	
	Contingencies				583 50	
						2,730 50
Stratton, W. C.	Salary for year		49 92	9 00	2,441 04	
	Contingencies				435 83	
						2,876 87
Kenning, J. H.	Salary for year			9 00	2,391 00	
	Contingencies				493 34	
						2,884 34
	Quebec.					
Lawlor, H.	Salary for year		46 60	9 00	2,275 53	
	Contingencies				545 13	
						2,820 66
Rinfret, C. I.	Salary for year	125 00		9 00	2,366 00	
	Contingencies				244 59	
						2,610 59
	New Brunswick.					
Burke, T.	Salary for year		50 00	9 00	2,441 60	
	Contingencies				389 50	
						2,830 50
	Manitoba.					
Barrett, J. K.	Salary for year		50 00	9 00	2,441 00	
	Contingencies				1,142 85	
						3,583 85
	British Columbia.					
Gill, W.	Salary for year		50 00	9 00	2,441 00	
	Contingencies				474 20	
						2,915 20
	Inspector of Bonded Factories.					
Stratton, W. C.	Salary for year		6 00		294 00	
	Contingencies				144 58	
						438 58
	Inspector of Breweries and Malt Houses.					
Barrett, J. K.	Salary for year		6 00		294 00	
	Contingencies				723 04	
						1,017 04
	Inspector of Distilleries.					
Kenning, J. H.	Salary for year				300 00	
	Contingencies				177 55	
						477 55
	Inspector of Tobacco Factories.					
Lawlor, H.	Salary from March 9 to June 30, 1904		1 86		91 68	
	Contingencies				39 10	
						130 78

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1903-1904. *Continued.*

To whom paid.	Service.	Amounts paid.	Total amounts paid.
	General Contingencies.	$ cts.	$ cts.
American Bank Note Co.	To pay for stamps and labels supplied	42,000 00	
British American Bank Note Co	To pay for bottling labels	4,868 50	
Eimer & Amend	1 doz. setts small glass wine stills and packing case	73 35	
Lyman, Son & Co.	Chemical apparatus	2 55	
Canadian Rubber Co	10 lbs. rubber tubing at $2.25	22 50	
Edwards, W. C. & Co	Lumber and cartage	34 05	
Thornton & Truman	Buffing wheels, iron hoops, repairing keys and locks	116 20	
Oertling, L	156 padlocks and packing	154 01	
Rinfret, C. I.	Travelling expenses in connection with civil service examinations, Montreal and Ottawa	94 40	
Gooderham & Worts	Alcohol	22 68	
Cheseldine, J. H	Fare to Toronto attending special class examination	2 00	
Brennan, D. J	" " "	2 00	
Irwin, R	" " "	2 00	
Brown, W. J	" " "	6 75	
Powell, J. B	" for T. Brain attending examination	3 90	
Fraser, P	Fare to St. John attending examination	16 08	
McArthur, G. H	" Windsor and London attending examination	6 60	
Belleperche, A. J. E	" " "	6 60	
McFarland, C. D	" Kingston and Montreal	10 56	
Bailey Co., G	Repairing padlocks	3 50	
Miller Lock Co	Locks and keys	1,210 95	
Nigretti & Zambra	Hydrometers, test glasses, &c	343 41	
Ottawa 'Citizen' Co	Advertising	2 80	
The 'Danebrog'	"	3 00	
The 'Journal'	"	6 56	
Ottawa 'Free Press'	"	7 00	
Carson, Hugh	12 leather cases	27 00	
The Pritchard & Andrews Co	Rubber stamps pads, daters and repairs, &c	232 60	
Whitehead, Mrs. J	Cleaning storerooms for year	157 00	
Allen, G. A	Travelling expenses	107 95	
Gerald, W. H	"	113 20	
Gerald, Charles	"	176 95	
Thornburn, Jas	Provisional allowance for the year	99 96	
Canadian Express Co	Express charges	45 91	
Canadian Pac. Ry. Co	Freight charges	8 89	
Busby, E. S	Gratuity voted by Parliament	500 00	
Lawlor, H	Travelling expenses	110 40	
Fréchette, A.	Technical translation	100 00	
Dominion Express Co	Express charges	47 85	
Canada Atlantic Ry.	Freight charges	1 11	
Potvin, Napoléon	Petty expenses	2 05	
	Total general contingencies		50,752 76
	Law Costs.		
Gonin, Hon. Lomer	Law costs in *re* Rex *vs.* J. B. Barrette		10 00
Chisholm, D. C	" " R. R. Gillies	20 00	
"	" " John McDonald	23 00	
"	" " Duncan McDonald	5 00	
"	" " Donald McDonald	5 00	
			53 00
Davidson, Paterson & Grant	" " Robt. Callum		20 00
Howay, F. W	" " Louis Blue	71 76	
"	" " Sing and Jim	91 80	
			163 56
Millish, H	" " T. L. Kent	50 00	
"	" " R. S. Bank	79 50	
			129 50
Robitaille & Roy	" " M. E. Lavoie		41 50
Winslow, C	" " G. Gautreau		196 63
	Total for law costs		614 19

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1903-1904.—*Continued.*

To whom paid.	Place of Residence.	Service.	Amounts paid.	Total amount paid.
		Commission to Customs Officers.	$ cts.	$ cts.
Boyd, A.	Antigonish, N. S.	From July 1, 1902 to June, 30, 1903.	146 40	
McDonald, F. J.	New Glasgow, N.S.	" " "	196 40	
McPherson, J.	North Sydney, N.S.	" "	146 40	
Ferguson, D.	Chatham, N.B.	" "	196 40	
Street, A. F.	Fredericton, N.B.	" "	246 40	
Binney, J. W.	Moncton, N.B.	" "	246 40	
Park, W. A.	Newcastle, N.B.	" "	146 40	
Anderson, J. J.	Sackville, N.B.	" "	127 85	
Kirk, J. T.	Sussex, N.B.	" "	125 96	
Pound, J. T.	Morden, Man.	" "	196 40	
Gilhuly, R. H.	Selkirk, Man.	" "	146 40	
Nadeau, M.	Clair, N.B.	" "	46 10	
Clark, A. J.	Campobello, N.B.	" "	27 19	
Marsh, R. J. F.	Fort Francis, Man.	" "	44 23	
Lownsborough, W.	Lindsay, Ont.	" "	34 72	
Brodeur, S. H.	Valleyfield, Que.	" "	246 40	
McKenzie, W.	North Bay, Ont.	" "	196 40	
Britton, W. H.	Gananoque, Ont.	" " 1904.	342 80	
Gilpin, R. R.	Grand Forks, B.C.	" " 1903.	146 40	
Dawson, D.	Petrolia, Ont.	" Dec. 31, 1903.	294 88	
Stanley, T. D.	St. Mary's, Ont.	" June 30, 1904.	174 27	
Tennant, J. F.	Gretna, Man.	" Jan. 31, 1904.	260 92	
Keay, W. S.	Fernie, B.C.	" Oct. 2, 1903.	307 98	
Kavanagh, A. J.	Gaspé, Que.	July, 1903, to June 30, 1904.	120 91	
Allison, J. B.	Napanee, Ont.	" "	246 85	
Cauchon, Alf.	Lake Megantic, Que.	" "	146 40	
Beauchesne, P. C.	Paspebiac, Que.	" "	1 77	
Ross, W. T.	Picton, Ont.	" "	87 93	
McGuire, T. J.	Trenton, Ont.	" Nov. 30, 1903.	81 83	
Kenny, J.	Lethbridge, N.W.T.	" Oct. 31, 1903.	65 47	
Daly, J. A.	Campbellford, Ont.	Oct. 7, 1903, to June 30, 1904.	119 74	
Fraser, R.	Trenton, Ont.	Dec. 1, 1903, to June 30, 1904.	114 57	
Small, E. B.	Cranbrook, B.C.	March 1, 1903, to June 30, 1903.	65 47	
Blair, H. C.	Truro, N.S.	Advance on account of Ex. Com.	50 00	
Busby, E. S.	Dawson, Y. T.	From Sept. 25, 1902 to June 30, 1903.	197 30	
Brodeur, S. H.	Valleyfield, Que.	Guarantee 12 mos. paid up to June 30, 1903	3 60	
Pound, J. T.	Morden, Man.	" 12 " " 1903	3 60	
Gilhuly, R. H.	Selkirk, Man.	" 12 " " 1903	3 60	
Marsh, R. J. F.	Fort Francis, Man.	" 12 " " 1903	3 60	
Stanley, T. D.	St. Mary's, Ont.	" 24 " " 1904	7 20	
Lownsborough, W.	Lindsay, Ont.	" 24 " " 1904	7 20	
Boyd, A.	Antigonish, N.S.	" 12 " " 1903	3 60	
McDonald, J. F.	New Glasgow, N.S.	" 12 " " 1903	3 60	
Cauchon, A.	Lake Megantic, Que.	" 12 " " 1904	3 60	
Douglass, D.	Banff, N.W.T.	" 12 " " 1903	3 60	
McPherson, J.	North Sydney, N.S.	" 12 " " 1903	3 60	
Clark, A. J.	Campobello, N.B.	" 12 " " 1903	3 60	
Ferguson, D.	Chatham, N.B.	" 12 " " 1903	3 60	
Nadeau, M.	Clair, N.B.	" 12 " " 1903	3 60	
Street, A. F.	Fredericton, N.B.	" 12 " " 1903	3 60	
Binney, J. W.	Moncton, N.B.	" 12 " " 1903	3 60	
Park, W. A.	Newcastle, N.B.	" 12 " " 1903	3 60	
Anderson, J. J.	Sackville, N.B.	" 12 " " 1903	3 60	
Kirk, J. T.	Sussex, N.B.	" 12 " " 1903	3 60	
Gilpin, R. R.	Grand Forks, B.C.	" 12 " " 1903	3 60	
Campbell, G.	Moyie City, B.C.	" 12 " " 1903	3 60	
Stevenson, J. K.	Moosejaw, N.W.T.	" 12 " " 1903	3 60	
Veniot, P. J.	Bathurst, N.B.	" 12 " " 1903	3 60	
Tennant, J. F.	Gretna, Man.	" 19 " Jan. 31, 1904	5 70	
Busby, E. S.	Dawson, Y.T.	" 9 " June 30, 1903	2 70	
Keay, W. S.	Fernie, B.C.	" 15 " Oct. 2, 1903	4 52	
Dawson, D.	Petrolia, Ont.	" 18 " Dec. 2, 1903	5 11	
McKenzie, W.	North Bay, Ont.	" 13 " July 31, 1903	3 90	

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1903 1904. *Continued.*

To whom paid.	Place of Residence.	Service.	Amounts paid.	Total amount paid.
		Commission to Customs Officers—Con.	$ cts.	$ cts.
Britton, W. H.....	Gananoque, Ont ...	Guarantee 24 mos. paid up to July 31, 1904	7 20	
McDermott, A. C...	Cranbrook, B.C.....	" 8 " Feb. 28, 1903	2 40	
Small, E. H	" "	" 5 " June 30, 1903	1 50	
Kenny, J.....	Lethbridge, N.W.T.	" 13 " Oct. 31, 1903	3 90	
Conway, T. A	Ladysmith, B.C	" 4 " June 30, 1903	1 20	
Vallean, A. S.....	Deseronto, Ont.....	" 1 " July 31, 1903	30	
Ross, W. T.	Picton, Ont....	" 12 " June 30, 1904	3 60	
McGuire, T. J	Trenton, Ont.	" 5 " Nov. 30, 1903	1 50	
Anderson, T. E.....	Napanee, Ont.....	" 1 " July 31, 1903	30	
Joncas, P. L.	Magdalen Islands, Q.	" 5 " Nov. 30, 1903	1 50	
Daly, J. A.....	Campbellford, Ont..	" from Oct. 7, 1903, to June 30, 1904	2 64	
Beauchesne, P. C ...	Paspébiac, Que.. ...	" 12 mos. to June 30, 1904.....	3 60	
Kavanagh, A. J	Gaspé, Que.....	" 12 " "	3 60	
Allison, J. B.....	Napanee, Ont.....	" 11½ " "	3 15	
Fraser, R...	Trenton, Ont.	" 11 " "	2 10	
		Total Commission to Customs Officers.	5,492 35	
		Less refund	8 70	
				5,483 66
		Commission on Tobacco Stamps.		
Toupin, J. A..	Montreal, Que.....	Allowance, 5 p. c on sale of stamps....	1 74	
Forest, J. O. F	L'Epiphanie.....	" " "	54 00	
Lapierre, J..	St. Alexis	" " "	19 75	
Grignon, A...	St. Eustache.....	" " "	2 18	
Labelle, Louis	Joliette.	" " "	3 00	
		Total	....	80 67

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1903-1904.—*Continued.*

To whom paid.	Service.	Amounts paid.	Total amounts paid.
	Duty-pay.	$ cts.	$ cts.
Gerald, Chas.	From July 1, 1903, to June 30, 1904	200 00	
Jamieson, R. C.	" "	150 00	
Hurst, L. B.	" "	100 00	
Howard, W. W. S.	" "	100 00	
O'Leary, T. J.	" "	100 00	
Doyle, B. J.	" "	100 00	
Jones, H.	" "	100 00	
Graham, W. T.	" "	100 00	
Dick, Walter	" "	200 00	
Bouteiller, G. A.	" "	200 00	
Gow, J. E.	" "	150 00	
Brennan, J.	" "	100 00	
Thomas, R.	" "	100 00	
Bayard, G. A.	" "	100 00	
Marcon, F. E.	" "	100 00	
Falconer, J. E.	" "	100 00	
Cahill, J. W.	" "	100 00	
Chilvers, F. W.	" "	100 00	
Keogh, P. M.	" "	100 00	
Howie, Alex.	" "	150 00	
Bish, Philip	" "	100 00	
Kilroy, E. F.	" "	100 00	
Woodward, G. W.	" "	100 00	
Dawson, W.	" "	100 00	
Gerald, W. H.	" "	150 00	
Macdonald, A. B.	" "	150 00	
Keeler, G. S.	" "	100 00	
Standish, J. G.	" "	100 00	
McCoy, W.	" "	150 00	
McFee, A. C.	" "	100 00	
Baby, W. A. D.	" "	100 00	
Brennan, W. J.	" "	150 00	
Irwin, Robt.	" "	100 00	
Cameron, D. M.	" "	200 00	
Mason, F.	" "	100 00	
Goodman, A. W.	" "	100 00	
Taylor, G. W.	" "	150 00	
Moreau, Aug.	" "	100 00	
Ralston, Tim.	" "	100 00	
Olivier, H.	" "	100 00	
Blais, J. C. F.	" "	100 00	
Walsh, D. J.	" "	100 00	
Desaulniers, J. E. A.	" "	200 00	
Millier, E.	" "	150 00	
Scullion, W. J.	" "	100 00	
Mulrooney, G.	" "	75 00	
Coleman, J. J.	" "	150 00	
Quinn, J. D.	" "	150 00	
Murray, D.	" "	100 00	
Malo, T.	" "	100 00	
Weyms, C.	" "	100 00	
Traversy, F. X.	" "	100 00	
Johnson, J. J.	" "	100 00	
Bernard, N. J. D.	" "	100 00	
McArthur, G.	" to Sept. 30, 1903	25 00	
Benetean, S.	" "	25 00	
Bousquet, J. O.	" to Sept. 25, 1903	23 64	
Waller, John.	" to Dec. 31, 1903.	100 00	
Johnston, G. E.	" to Oct. 31, 1903.	33 33	
Berry, H. L.	From Aug. 1, 1903, to June 30, 1904.	137 50	
Gauvin, E.	" Sept 26, to Nov. 9, 1903.	12 23	
Bernier, J. A.	" Nov. 10, 1903, to June 30, 1904.	64 13	

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1903-1904. *Concluded.*

To whom paid.	Service.	Amounts paid.	Total amounts paid.
	Duty-pay.	$ cts.	$ cts.
Adam, A. R	From Jan. 1, to June 30, 1904	50 00	
Whelan, T. E	" Jan. 9, "	50 00	
McPherson, E. A	" Jan. 9, "	47 58	
Hicks, W. H	" Mar. 17, to April 11, 1904	14 28	
Young, R. E	" Jan. 1, to Mar. 16, 1904, and from April 12, to June 30, 1904	85 72	
Allen, G. A	" July 1, to Aug. 24, 1903, at $150 per annum, =$22 17, and from Aug. 25, 1903, to June 30, 1904, at $100 per annum, =$85.21	107 38	
	Total duty-pay		7,200 79
	Grand total		440,118 72
	ADD—Printing	6,600 86	
	Stationery	1,671 23	
	Lithographing and engraving, &c	1,096 75	
			9,368 84
	Authorized disbursements (less superannuation, insurance, retirement and guarantee)		449,487 56
	ADD—Balances due to Collectors, July 1, 1903	343 98	
	" by " June 30, 1904	49 08	
			393 06
			449,880 62
	LESS—Balances due by Collectors, July 1, 1903	343 98	
	" to " June 30, 1904	49 08	
			393 06
	Actual disbursements agreeing with Statement No. 4, page 12		449,487 56

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

APPENDIX B—*Continued.*

No. 2.—Distribution of Seizures for the Year ended June 30, 1904.

Divisions.	To whom paid.	Service.	Amounts paid.	Totals.
		Ontario.	$ cts.	$ cts.
Belleville	Iler B.	For his share of seizure, No. 9	33 95	
		To pay informer penalty in seizure, No. 9	37 50	
				71 45
Brantford	Sloan, W.	" " " " 46		25 00
Kingston	Dickson, C. T.	For his share of seizure, No. 87	22 00	
		To pay informer penalty in seizure, No. 87	25 00	
				47 00
Ottawa	Slattery, R.	For his share of seizure, No. 205		23 50
	Freeland, A.	To pay informer penalty in seizure, No. 205		25 00
St. Catharines	Hesson, C. A.	" " " " 32		50 00
Toronto	Floody, E.	For his share of seizure, No. 381	12 50	
		" " " 392	8 33	
				20 83
	Frankland, H. R.	" " " 389	12 50	
		" " " 390	25 00	
		" " " 391	25 00	
		" " " 392	8 33	
		" " " 393	10 00	
		" " " 394	12 50	
		" " " 395	12 50	
		" " " 396	25 00	
		" " " 397	12 50	
		" " " 398	5 00	
				148 33
		To pay informer penalty in seizure, No. 381	12 50	
		" " " 392	25 00	
		" " " 396	25 00	
		" " " 397	25 00	
		" " " 399	12 50	
		" " " 400	12 50	
		" " Genl. No. 4,779	12 50	
				125 00
	Mahoney, H.	For his share of seizure, No. 389	12 50	
		" " Genl. No. 4,779	12 50	
				25 00
	Falconer, R. H.	" " " 392	8 34	
		" " " 398	5 00	
				13 34
	Dager, H. J.	" " " 393	10 00	
		" " " 394	12 50	
		" " " 395	12 50	
		" " " 397	12 50	
				47 50
		Quebec.		
Montreal	Bousquet, J. O.	For his share of seizure, No. 1,079		2 88
	Normandin, G.	" " " 1,079	2 87	
		" " " 1,082	56 07	
				58 94
	Karney, D. J.	" " " 1,081		2 50
	McDonnell, M. J.	" " " 1,081		2 50
	Crevier, J. H.	" " " 1,082		56 08
	Brabant, J. B. C. N.	" " " 1,083		26 80
	Comte, J.	" " " 1,083		26 80
Quebec	LaRue, G.	To pay informer penalty in seizure, No. 547		5 00
		New Brunswick.		
St. John	Belyea, T. H.	To pay informer penalty in seizure, No. 109	125 00	
		" " " 110	125 00	
		" " " 111	75 00	

APPENDIX B—*Continued.*

No. 2.—Distribution of Seizures for the Year ended June 30, 1904.

Divisions.	To whom paid.	Service.	Amounts paid.	Totals.
		New Brunswick—Concluded.	$ cts.	$ cts.
St. John	Belyea, T. H.	To pay informer penalty in seizure, No. 112.	50 00	
		" " " 113.	114 50	
		" " " 117.	15 00	
				504 50
	Bonness, J. D	For his share of seizure, No. 105	25 00	
		" " " 106	25 00	
		" " " 107	50 00	
		" " " 108	25 00	
		" " " 109	31 25	
		" " " 110	31 25	
		" " " 111	37 50	
		" " " 112	25 00	
				250 00
	Carpenter, J. A	" " " 106	25 00	
		" " " 109	31 25	
		" " " 110	31 25	
				87 50
	Taylor, H	" " " 108		25 00
		Nova Scotia.		
Halifax	Grant, H. H.	For his share of seizure, No. 185	92 60	
		To pay informer penalty of seizure, No. 188.	150 00	
				242 60
	Tompkins, P.	For his share of seizure, No. 188		71 72
	Blethen, C. W.	" " " 188		71 73
Pictou	Fraser, P	" " " 104	17 84	
		To pay informer penalty in seizure, No. 106.	50 00	
		" " " 107.	50 00	
				117 84
	Murray, D.	For his share of seizure, No. 97	90 86	
		" " " 104	17 84	
		" " " 106	38 01	
		" " " 107	44 79	
				191 50
		British Columbia.		
Vancouver	Miller, J. E	For his share of seizure No. 30	66 76	
		To pay informer penalty in seizure No. 31	100 00	
				166 76
	Parkinson, E. B	For his share of seizure No. 29		13 31
		Total for distribution of seizures		2,545 91

RECAPITULATION.

	$
Ontario	621 95
Quebec	181 50
New Brunswick	867 00
Nova Scotia	695 39
British Columbia	180 07
	2,545 91

W. J. GERALD,
Deputy Minister.

Inland Revenue Department,
Ottawa, August 19, 1904.

APPENDIX B—*Continued.*

No. 3.—DETAILS of Sundry Minor Expenditures for the Fiscal Year ended June 30, 1904.

To whom paid.	Service.	Deductions for Superannuation.	Amounts paid.	Totals.
	Minor Expenditures.		$ cts.	$ cts.
American Bank Note Co.	For printing law stamps		10 51	
Hull City Advance	Advertising Quyon ferry		7 35	
Dominion Express Co.	Express charges to Dawson		15 55	
	Total, agreeing with Statement No. 12, page 21			33 41
	ADULTERATION OF FOOD.	$ cts.		
Macfarlane, Thomas	Salary as Chief Analyst for the year	60 00	2,940 00	
McGill, A.	" 1st Assistant Analyst for the year	43 96	2,156 04	
Wright, S. E.	" Clerk in laboratory for the year		600 00	
Leveque, H.	" Messenger in laboratory from July 1, 1903, to March 31, 1904		419 94	
Ladouceur, Louis	" Messenger in laboratory from April 15, to June 30, 1904		147 77	
Kidd, Thomas	" Food Inspector for the year		500 00	
Costigan, J. J.	" " "	7 00	343 00	
Ferguson, J. C.	" " "	4 00	196 00	
Waugh, R. J.	" " "		300 00	
Conklin, W. M.	" " "		200 00	
Fletcher R. W	" " "		200 00	
Parkinson, E. B.	" " "		200 00	
Roulean, J. C.	" " "		200 00	
Moore, T.	" " "		100 00	
		114 96		8,502 75
	Contingencies.			
Macfarlane, T.	Travelling and contingent expenses in connection with laboratory		2,428 62	
"	Rent of laboratory		400 00	
Kidd, Thomas	Travelling expenses and purchases of samples		341 21	
Costigan, J. J.	" "		538 94	
Ferguson, J. C.	" "		250 37	
Waugh, R. J.	" "		151 59	
Conklin, W. M.	" "		192 78	
Fletcher, R. W.	" "		148 07	
Parkinson, E. B.	" "		133 55	
Roulean, J. C.	" "		364 02	
Moore, T.	" "		57 37	
				5,006 52
Fiset, M.	Allowance under Act for retaining fees		200 00	
	" " material used in analysis		100 00	
				300 00
Ellis, W. H.	" " retaining fees		200 00	
	" " rent		100 00	
	" " material used in analysis		100 00	
	Fees for analysis		400 00	
				800 00
Donald, J. T.	Allowance under Act for retaining fees		200 00	
	" " rent		100 00	
	" " material used in analysis		100 00	
	Fees for analysis		426 00	
				826 00

SESSIONAL PAPER No. 12

APPENDIX B—*Continued.*

No. 3.—DETAILS of Sundry Minor Expenditures, 1903 1904—*Concluded.*

To whom paid.	Services.	Amounts paid.	Totals.
	ADULTERATION OF FOOD—*Concluded.*	$ cts.	$ cts.
	Contingencies—Concluded.		
Bowman, M.	Allowance under Act for retaining fees	200 00	
	" " rent	100 00	
	" " material used in analysis	100 00	
	Fees for analysis	393 00	
			793 00
Kenrick, E. B.	Allowance under Act for retaining fees	200 00	
	" " rent	100 00	
	" " material used in analysis	100 00	
	Fees for analysis	140 00	
			540 00
Fagan, J. C.	Allowance under Act for retaining fees	200 00	
	" " rent	100 00	
	" " material used in analysis	100 00	
	Fees for analysis	124 00	
			524 00
Valade, F. X.	Allowance under Act for retaining fees	200 00	
	" " rent	100 00	
	" " material used in analysis	100 00	
			400 00
Harrison, F. T.	Allowance under Act for retaining fees	50 00	
	" " material used in analysis	25 00	
	Fees for analysis	72 00	
			147 00
Eimer & Amend	Chemicals and apparatus for laboratory	58 22	
Lyman Sons & Co.	" " "	256 69	
Gooderham & Worts	Alcohol for laboratory	62 54	
The Chemist and Surgeons Supply Co.	Apparatus for laboratory	78 74	
Ahearn-Soper, Ltd.	One motor and instalment of same	142 46	
Girdwood, Dr. G. P.	Attending analysts examinations, Montreal	20 00	
Bausch & Lamb Optical Co.	Repairs to apparatus	1 73	
Choquette, Rev. C. P.	Attending analysts examinations, Montreal	27 50	
Harris, Campbell & Boyden Furniture Co.	Furniture and boxes	11 40	
Harrison, F. T., estate of.	Apparatus for laboratory	389 14	
Giroux, H.	Maple sugar and syrup	5 45	
Lemoine, Alp.	Services in laboratory during the year	600 00	
Valin, J. A.	" " "	500 00	
			2,153 87
	Total adulteration of food expenditures		19,993 14
	Add—Printing	789 44	
	Stationery	82 01	
	Lithographing	15 00	
			886 45
	Grand total, agreeing with Statement No. 8, page 17		20,879 59

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

W. J. GERALD,
Deputy Minister.

APPENDIX B—*Continued.*

No. 4.—Details of Departmental Expenditures for the Year ended June 30, 1904.

Names.	Rank.	Period.	Deductions for			Amounts paid.	Totals.
			Superannuation.	Retirement.	Insurance.		
	Salaries.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Bernier, Hon. M. E.	Minister	July 1, '03, to Jan. 18, '04.				3,838 69	
Brodeur, Hon. L. P.	"	Jan. 19, '04, to June 30, '04				3,161 31	
Gerald, W. J.	Deputy Minister	For the year				3,750 48	
Himsworth, Wm.	Chief Clerk, Secretary	"				2,425 00	
Campeau, F. R. E.	Chief Clerk, Accountant	"	48 50			2,376 50	
Valin, J. E.	Assistant Accountant	"	36 50			1,788 50	
Carter, Wm.	Assistant Secretary	"	36 50			1,788 50	
Shaw, J. F.	Chief Statistical Clerk, Accountant's Branch	"	35 00			1,715 00	
Doyon, J. A.	Weights and Measures Clerk, Accountant's Branch	"	33 00			1,617 00	
Westman, Thos.	Statistical Clerk, Accountant's Branch	"	32 00			1,568 00	
Quain, R.	Accountant's Branch Clerk	"	45 00		61 92	1,393 08	
Fowler, G.	Clerk of Supplies, Secretary's Branch	"	30 00			1,470 00	
Newby, F.	Secretary's Branch Clerk	"	28 50			1,396 50	
Dunne, Jno. P.	Accountant's Branch Clerk	"	28 50			1,396 50	
Burns, J.	Weights and Measures Clerk, Accountant's Branch	"	28 50			1,396 50	
Hudon, L. E.	Statistical Clerk, Accountant's Branch	"	43 75			1,206 25	
Hughes, P. A.	Accountant's Branch Clerk	"	42 00			1,158 00	
McCullough, A.	Secretary's Branch Clerk	"	24 00			1,176 00	
Halliday, Wm. A.	Accountant's Branch Clerk	"	42 00			1,158 00	
Bouchette, R. E.	Weights and Measures Clerk, Accountant's Branch	July 1, '05, to Dec. 11, '03	18 75			516 75	
Roy, L. G.	Accountant's Branch Clerk	For the year	36 16			997 12	
Garneau, Hector	Second Class Clerk	Apl. 11, '04, to June 30, '04		13 33		253 33	
Garneau, Hector	Chief Private Secretary	"				44 43	
Chevrier, B.	Junior Second Class Clerk	For the year		38 43		730 32	
Lawless, E. M.	Secretary's Branch Clerk	"		37 64		715 50	
Hagerty, B.	" "	"		37 64		715 50	
Charbonneau, E.	" "	"		37 64		715 50	
Brodeur, P. E. S.	Statistical Clerk, Accountant's Branch	Dec. 18, '03, to June 30, '04		21 48		408 58	
Chateauvert, G. E.	Accountant's Branch Clerk	Dec. 12, '03, to June 30, '04		19 38		368 25	
Doyle, E. F.	Secretary's Branch Clerk	"		13 84		263 04	
Watson, V. M.	Third Class Clerk	"		13 84		263 04	
Goodhue, M. L. E. B.	Weights and Measures Clerk, Accountants Branch	Dec. 19, '03, to June 30, '04		13 38		254 10	
Trumpour, G.	Third Class Clerk	Jan. 1, '04, to June 30, '04		12 50		237 50	
Bourgault, Alphonse	Private Secretary	July 1, '03, to Jan. 18, '04				329 03	
Wiallard, R. A.	Assistant Private Secretary	Jan. 19, '04, to June 30, '04				180 63	
Potvin, Nap.	Messenger	For the year	21 00			579 00	
Yetts, R. P.	"	"	15 30		54 48	440 22	
			624 96	259 10	116 40		43,791 65

SESSIONAL PAPER No. 12

APPENDIX B—*Continued.*

No. 4.—DETAILS of Departmental Expenditures, 1903–1904—*Continued*

Names.	Service.	Amounts paid.	Totals.
	Contingencies.	$ cts.	$ cts.
Doyle, Miss E. F.	Extra clerk from July 1 to Dec. 11, 1903	192 02	
Watson, Miss A.	" July 1 to Oct. 1, 1903	119 48	
Robert, A.	Extra messenger for year	446 93	
Bourgeois, E.	" "	402 40	
Potvin, Napoléon	Sundry petty expenses	5 25	
Controller of Stationery	Stationery	2,861 33	
" "	Parliamentary publications	1 00	
Kings' Printer	Printing	1,001 77	
C. P. Railway Co.'s Telegraph	Telegraph account	152 06	
G. N. W. Telegraph Co.	"	133 86	
The Bell Telephone	Telephone messages	20 30	
Postmaster	Postage	34 35	
Gerald, W. J.	Travelling expenses	135 85	
Graves Bros.	Padlocks	12 50	
Watson, V. M.	Extra clerk from Aug. 24 to Dec. 11, 1903	107 77	
Bryson & Graham	Towels, &c., &c	15 43	
Brodeur, Hon. L. P.	Travelling expenses	182 81	
Wiallard, R. A.	"	100 95	
Garneau, Hector	"	12 00	
Lacas, Emile	Photograph	8 00	
The Ottawa Electric Railway	Tickets	30 00	
Storr, A. M.	Cartage	88 00	
Maveity, Mrs. S.	Washing towels	55 00	
Canadian Express Co.	Freight	9 15	
Dominion Express Co	"	3 60	
Latremouille, C.	Matches, combs, brushes, tumblers, &c.	19 85	
Payment, Thomas	Soap, &c	20 65	
Sproule, W. H.	Repairing clocks	6 50	
Dupont, J. C.	Matches	2 00	
Skinner & Co	Brushes, &c	2 75	
La Cie de Publication du Canada	Subscription	10 50	
Daily World, Vancouver, B. C.	"	5 00	
Telegraph Publishing Co., St. John	"	5 00	
Herald Publishing Co., Montreal	"	12 00	
Tribune Publishing Co., Winnipeg	"	2 00	
La Presse, Montreal	"	6 00	
Bulletin des Recherches Hist., Lévis	"	2 00	
Munn & Co., New York	"	7 00	
The Gazette, Montreal	"	12 00	
Daily Witness, Montreal	"	6 00	
Mail and Empire, Toronto	"	4 00	
Le Temps, Ottawa	"	3 00	
L'Union des Cantons de l'Est, Sherbrooke	"	6 00	
L'Union Ouvrière, Montreal	"	0 41	
Can. Mining Review, Ottawa	"	6 00	
The News, Toronto	"	1 00	
Toronto Saturday Night	"	4 00	
Can. Manufacturer, Toronto The	"	1 00	
The Banner News, Chatham	"	4 00	
Ottawa Free Press	"	9 95	
La Patrie, Montreal	"	9 00	
La Nation, St. Jerome	"	2 00	
Acadian Recorder, Halifax	"	5 00	
Toronto Daily Star, Toronto	"	1 00	
Evening Journal, Ottawa	"	6 60	
Catholic Register, Toronto	"	1 00	
Montreal Daily Star, Montreal	"	3 00	
Acadiensis, St. John	"	1 50	
Daily Telegraph, Quebec	"	6 00	
The Citizen, Ottawa	"	16 50	
Canadian Gazette, London, Eng.	"	4 38	
Jones, Yarrell & Poulter, London, Eng	"	16 32	
The Times, Hamilton	"	3 00	

APPENDIX B—*Continued.*

No. 4.—DETAILS of Departmental Expenditures, 1903-1904—*Concluded.*

Names.	Service.	Amounts paid.	Totals.
	Contingencies—Con.	$ cts.	$ cts.
Le Pionnier Canadien, Hull	Subscription	1 00	
Le Progres de Valleyfield, Valleyfield	"	1 00	
Manitoba Free Press, Winnipeg	"	4 00	
Intelligencer, Belleville	"	3 00	
The Toronto World, Toronto	"	5 00	
North Bay Times, North Bay	"	1 00	
The Journal, St. Catharines	"	12 00	
L'Union, St. Hyacinthe	"	4 00	
The Chronicle, Montreal	"	1 50	
Daily World, Toronto	"	5 00	
L'Evangeline, Weymouth	"	1 00	
The Saskatchewan, Saskatchewan	"	1 50	
Progrès, Windsor	"	4 50	
Chronicle Publishing Co., Halifax	"	6 00	
Le Soleil, Quebec	"	6 00	
Daily Telegraph, St. John	"	5 00	
The Nation, New York	"	3 00	
Le Bulletin, Montreal	"	1 00	
Le Petit Canadien, Quebec	"	0 50	
The Confederate, Mount Forest	"	1 00	
The Farmer's Advocate, London	"	1 50	
The Shareholder, Montreal	"	4 00	
	Total departmental contingencies		6,438 22
	Authorized disbursements (less superannuation, retirement and insurance)		50,229 87
	ADD—Balance due June 30, 1904		16 66
			50,246 53
	LESS—Balance due July 1, 1903		16 66
	Actual disbursements, agreeing with Statement No. 17, page 48		50,229 87

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

W. J. GERALD,
Deputy Minister.

APPENDIX B—*Continued.*

No. 5.—DETAILS of Weights and Measures Expenditures for the Year ended June 30, 1904.

To whom paid.	Service.	Deductions for			Amounts paid.	Total amounts paid.
		Retirement.	Superannuation.	Guarantee fee.		
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
	Belleville.					
Johnson, W	Salary as Inspector for year		24 00	3 60	1,172 40	
Slattery, T	" Assistant Inspector for year		13 96	1 80	684 24	
Irwin, S	" " "		13 96	1 80	684 24	
Behan, J. J	" Assistant Inspector from July 1 to Aug. 6, 1903			0 17	57 89	
Errett, R. W	" Assistant Inspector for year			1 80	248 16	
	Salaries		51 92	9 17	2,846 93	
	Contingencies				2,748 36	
						5,595 29
	Hamilton.					
Freed, A. T	Salary as Inspector for year			3 60	1,596 36	
McDonald, J	" Assistant Inspector for year		16 04	1 80	782 16	
Marentette, A	" " "		16 04	1 80	782 16	
Fitzgerald, E. W	" " "			1 80	748 20	
Wheatley, A. E	" " "			1 80	798 12	
Laidman, R. H	" " "			1 80	698 16	
Jarvis, H	" " "			1 80	648 12	
Robins, S. W	" " "			1 80	598 20	
	Salaries		32 08	16 20	6,651 48	
	Contingencies				1,375 08	
						8,026 56
	Ottawa.					
Macdonald, J. A	Salary as Inspector for year			3 60	1,396 32	
Breen, J	" Assistant Inspector for year			1 80	698 16	
McFarlane, J	" " "		13 96	1 80	684 24	
Winsor, J	" " "			1 80	698 16	
Elliott, T. H	" Assistant Inspector from July 1 to Oct. 1, 1903 (insurance)	10 44		0 45	139 11	
Findlay, R	" Assistant Inspector for year			1 80	498 12	
Scott, Jos	" Assistant Inspector from March 1 to June 30, 1904			0 60	166 04	
	Salaries	10 44	13 96	11 85	4,286 15	
	Contingencies				1,991 08	
						6,271 23
	Toronto.					
Kelly, D	Salary as Inspector for year			3 60	1,296 36	
Milligan, R. J	" Assistant Inspector for year			1 80	798 12	
Wright, R. J	" " "			1 80	782 16	
Smith, J. C	" " "			1 80	698 16	
Murdoch, J	" " "		16 04	1 80	698 16	
	Salaries		16 04	10 80	4,272 96	
	Contingencies				1,861 88	
						6,134 84
	Windsor.					
Hayward, W. J	Salary as Inspector for year		28 04	3 60	1,368 36	
Coughlin, D	" Assistant Inspector for year			1 80	798 12	
Thomas, J. S	" " "			1 80	798 12	
Hughes, R. A	" " "			1 80	798 12	
	Salaries		28 04	9 00	3,762 72	
	Contingencies				1,853 76	
						5,616 48

APPENDIX B—*Continued.*

No. 5.—Details of Weights and Measures Expenditures for the Year ended June 30, 1904—*Continued.*

To whom Paid.	Service.	Deductions for			Amounts paid.	Total amounts paid.
		Retirement.	Superannuation.	Guarantee.		
	Montreal.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Chalus, J. O.	Salary as Inspector for year	..	31 96	3 60	1,564 44	
Daoust, J. A.	" Assistant Inspector for year	.....	16 04	1 80	782 16	
Gervais, S.	" Assistant Inspector from July 1, 1903, to May 1, 1904	.....	13 30	1 50	651 80	
Hébert, J. A. P.	" Assistant Inspector for year.	.....	.....	1 80	798 12	
Boudet, E.	" " "	.....	.....	1 80	798 12	
Collins, D.	" " "	.....	.....	1 80	798 12	
Baker, J. S.	" " "	.....	.....	1 80	698 16	
Dessert, V.	" " "	.....	.....	1 80	698 16	
	Salaries	.....	61 30	15 90	6,789 08	
	Contingencies	.....	.....	.....	1,738 60	
						8,527 68
	Quebec.					
Guay, G. N.	Salary as Inspector, from July 1, 1903, to June 1, 1904	.....	.....	3 30	1,096 70	
LeBel, J. A. W.	" Assistant Inspector for year	.....	38 60	1 80	1,059 60	
Kelly, M. J.	" " " (Insurance)	38 28	23 96	1 80	735 96	
Guay, A.	" " "	.....	.....	1 80	698 16	
Prefontaine, F. H.	" " "	.....	.....	1 80	648 12	
Knowles, C.	" " "	.....	.....	1 80	698 16	
Petit, J. B.	" " "	.....	12 00	1 80	586 20	
Bourget, L.	" " "	.....	.....	1 80	498 12	
Moreau, A.	" Caretaker for year.	..	6 00	..	294 00	
	Salaries	38 28	80 56	15 90	6,315 02	
	Contingencies	.....	.....	.....	1,789 52	
						8,104 54
	St. Hyacinthe.					
Morin, J. P.	Salary as Inspector for year	.....	.....	3 60	846 36	
Tomlinson, W. M.	" Assistant Inspector for year	.....	.....	1 80	698 16	
Fournier, L. A.	" " "	.....	.....	1 80	698 16	
Beaulac, J. H.	" " "	.....	.....	1 80	598 20	
	Salaries	.....	..	9 00	2,840 88	
	Contingencies	.....	.....	.....	1,828 77	
						4,669 65
	Three Rivers.					
Gravel, A. L.	Salary as Inspector for year	.....	.....	3 60	996 36	
Boldue, E.	" Assistant Inspector for year	.....	.....	1 80	548 16	
	Salaries	.....	.....	5 40	1,544 52	
	Contingencies	.....	.....	.....	701 37	
						2,245 89
	St. John, N.B.					
Barry, Jas.	Salary as Inspector for year	.....	.....	3 60	1,196 40	
Cowan, E.	" Assistant Inspector for year	.....	13 96	1 80	684 24	
Richard, D.	" " " from July 1, to Sept. 1, 1903	.....	2 00	0 30	97 70	
Bernier, J. A.	" Assistant Inspector for year	.....	.....	1 80	598 20	
LeBlanc, F. X.	" " " from Oct. 16, 1903, to June 30, 1904	.....	.....	1 28	353 50	
	Salaries	.....	15 96	8 78	2,930 04	
	Contingencies	.....	.....	.....	565 00	
						3,495 04

SESSIONAL PAPER No. 12

APPENDIX B—*Continued.*

No. 5.—DETAILS of Weights and Measures Expenditures for the Year ended June 30, 1904—*Continued.*

To whom paid.	Service.	Deductions for. Retirement.	Superannuation.	Guarantee.	Amounts paid.	Total amounts paid.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
	Cape Breton.					
Laurence, G. C.	Salary as Inspector for year			3 60	846 40	
	Contingencies				464 78	
						1,311 18
	Halifax.					
Frame, A.	Salary as Inspector for year			3 60	996 36	
Waugh, R. J.	" Assistant Inspector for year			1 80	598 20	
	Salaries			5 40	1,594 56	
	Contingencies				1,736 30	
						3,330 86
	Pictou.					
Dustan, W. M	Salary as Inspector for year		19 96	3 60	976 44	
Chisholm, W. W.	" Assistant Inspector for year			1 80	648 12	
	Salaries		19 96	5 40	1,624 56	
	Contingencies				222 21	
						1,846 77
	Charlottetown.					
Davy, E	Salary as Inspector for year			3 60	946 32	
Hughes, H.	" Assistant Inspector for year			1 80	598 20	
	Salaries			5 40	1,544 52	
	Contingencies				234 15	
						1,778 67
	Winnipeg.					
Magness, R.	Salary as Inspector for year			3 60	1,396 32	
McDonald, A. W.	" Asst. Inspector for year			1 80	698 16	
Mager, J. G.	" " "			1 80	698 16	
Girdlestone, R. J. M	" " "		4 04	1 80	194 16	
Ross, H. E.	" " "			1 80	98 16	
McKay, R.	" " from Sept. 7 to June 30, 1904			1 50	570 13	
Gilby, W. F.	" Asst. Inspector from Jan. 1 to June 30, 1904			0 90	249 06	
	Salaries		4 04	13 20	3,904 15	
	Contingencies				2,096 32	
						6,000 47
	Calgary.					
Saucier, X.	Salary as Inspector for year			3 60	196 32	
Costello, J. W.	" Asst. Inspector for year		15 00	1 80	733 20	
	Salaries		15 00	5 40	929 52	
	Contingencies				323 30	
						1,252 82
	Victoria.					
Findley, H.	Salary as Inspector for year			3 60	796 32	
Parker, Thos.	" Asst. Inspector for year			1 80	698 16	
McAloney, J. A.	" " "			1 80	348 12	
	Salaries			7 20	1,842 60	
	Contingencies				1,787 81	
						3,630 41
	General.					
Fyfe, Jas.	Salary as Chief Inspector for year				2,500 00	
	Contingencies				646 15	
						3,146 15

APPENDIX B—*Continued.*

No. 5.—Details of Weights and Measures Expenditures for the Year ended June 30, 1904.—*Concluded.*

To whom paid.	Service.	Amounts paid.	Total amounts.
	General Contingencies.	$ cts.	$ cts.
American Bank Note Co.	Printing stamps	200 00	
Doyon, J. A	Travelling expenses	30 00	
Burgess, Thos	Salary as mechanical assistant for the year	831 12	
Thornton & Truman	Repairing automatic weighing machine	6 35	
Graves Bros	Glasses, screws, locks, nails, &c	36 09	
Pritchard & Andrews Co. The	Steel stamps, punches, &c	259 10	
Oertling, L	For 20 sets brass weights, verification, packing, &c	368 08	
Workman, A. & Co.	Machine screw taps, dies, screw-plates, &c	26 98	
Taschereau, C. E	Preparing lease, Quebec W. & M. Office	4 00	
Avery, W. & T.	Balance of account of metric weights and measures	83 08	
Taylor, S	Cartage	1 50	
Dominion Express Co.	Express charges	13 70	
Canadian Express Co.	" "	20 59	
Canadian Pacific Ry. Co.	Freight	7 47	
Potvin, N.	Petty expenses	45	
	Total general contingencies		1,888 51
	METRIC SYSTEM EXPENDITURES.		
Ulmann, Emile	Balance of account on 200 metric sets and charts	167 67	
Edwards, W. C. & Co.	Lumber and cartage	42 13	
McLennan, Prof. J. C.	Expenses incurred in connection of a lecture before the Committee of Agriculture at Ottawa	25 00	
Graves, Bros	300 lights glasses and hardware	36 84	
Canadian Express Co.	Express charges	91 45	
Dominion Express Co.	" "	51 94	
Canadian Pacific Ry. Co.	Freight charges	10 30	
	Total		425 33
	Grand total		83,298 37
	Add—Printing	746 97	
	Stationery	178 30	
			925 27
	Actual disbursements (less superannuation, insurance, retirement and guarantee)		84,223 64
	Add—Old balances due by Inspectors June 30, 1904		193 26
			84,416 90
	Less—Old balances due by Inspectors July 1, 1903		193 26
	Actual disbursements, agreeing with statement No. 20 A, page 54		84,223 64

W. J. GERALD,
Deputy Minister.

Inland Revenue Department,
Ottawa, August 19, 1904.

APPENDIX B—*Continued.*

No. 6.—DETAILS of Gas Inspection Expenditures, for the Year ended June 30, 1904.

To whom paid.	Service.	Deductions for Retirement.	Deductions for Superannuation.	Deductions for Guarantee.	Amounts paid.	Total amounts paid.
	Barrie.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Shanacy, M.	Salary as Inspector for year		2 00	3 60	94 40	
	Contingencies				0 80	
						95 20
	Belleville.					
Johnson, W.	Salary as Inspector for year		7 04	3 60	339 36	
Stuart, W. E.	" Assistant Inspector for year			2 88	97 08	
	Salaries		7 04	6 48	436 44	
	Contingencies				404 80	
						841 24
	Berlin.					
Broadfoot, S.	Salary as Inspector for year			3 60	96 40	
	Contingencies				57 16	
						153 56
	Brockville.					
Johnston, C. W.	Contingencies					135 41
	Cobourg.					
Bickle, J. W.	Salary as Inspector for year		2 00	3 60	94 40	
	Contingencies				61 06	
						155 46
	Cornwall.					
Mulhern, M. M.	Salary as Inspector for year		2 00	3 60	94 40	
	Contingencies				30 00	
						124 46
	Guelph.					
Broadfoot, S.	Salary as Inspector for year		4 00	3 60	192 40	
	Contingencies				20 25	
						212 65
	Hamilton.					
McPhie, D.	Salary as Inspector for year		36 00	3 60	1,760 40	
McPhie, W. H.	" Assistant Inspector for year			1 80	598 20	
Dennis, W. A.	" " "			1 80	98 16	
	Salaries		36 00	7 20	2,456 76	
	Contingencies				217 01	
						2,673 77
	Kingston.					
Behan, J. J.	Salary as Inspector from July 1, 1903, to August 6, 1903			0 34	38 36	
	Contingencies				128 75	
						167 11
	Listowel.					
Male, T.	Salary as Inspector for year			3 60	96 40	
	Contingencies				91 00	
						187 40
	London.					
Nash, A. F.	Salary as Inspector for year			3 60	1,096 40	
	Contingencies				377 55	
						1,473 95

APPENDIX B—*Continued.*

No. 6.—DETAILS of Gas Inspection Expenditures, for the Year ended June 30, 1904.

To whom paid.	Service.	Deductions for			Amounts paid.	Total amounts paid.
		Retirement.	Superannuation.	Guarantee.		
	Napanee.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Johnston, W.	Contingencies					33 70
	Ottawa.					
Roche, H. G.	Salary as Inspector for year			3 60	1,096 40	
	Contingencies				923 35	
						2,019 75
	Owen Sound.					
Graham, W. J.	Salary as Inspector for year		4 00	3 60	192 40	
	Contingencies				125 00	
						317 40
	Peterborough.					
Rork, T.	Salary as Inspector for year			3 60	146 40	
	Contingencies				19 05	
						165 45
	Sarnia.					
Hicks, W. H.	Salary as Inspector, from July 1, 1903 to May 16, 1904			1 61	85 72	
	Contingencies				32 45	
						118 17
	Stratford.					
Rennie G.	Salary as Inspector for year		4 00	3 60	192 40	
	Contingencies				19 55	
						211 95
	Toronto.					
Johnstone, J. K.	Salary as Inspector for year		34 04	3 60	1,662 36	
Pape, James	" Assistant Inspector for year			1 80	998 16	
Whyte, J. A.	" " " "			1 80	698 16	
Hunter, W. M.	" " from June 8 to June 30, 1904			0 11	38 22	
	Salaries		34 04	7 31	3,396 90	
	Contingencies				56 75	
						3,453 65
	Montreal.					
Aubin, A.	Salary as Inspector for year			3 60	1,596 36	
O'Flaherty, M. J.	" Assistant Inspector for year			1 80	798 12	
	Salaries			5 40	2 394 48	
	Contingencies				762 75	
						3,157 23
	Quebec.					
LeVasseur, N.	Salary as Inspector for year		19 96	3 60	976 44	
Moreau, J. A.	" Assistant Inspector for year		6 00		294 00	
	Salaries		25 96	3 60	1,270 44	
	Contingencies				201 04	
						1,471 48
	Sherbrooke.					
Simpson, A. F.	Salary as Inspector for year		3 00	3 60	143 40	143 40

SESSIONAL PAPER No. 12

APPENDIX B—*Continued.*

No. 6.—DETAILS of Gas Inspection Expenditures, for the Year ended June 30, 1904.

To whom paid.	Service.	Deductions for			Amounts paid.	Total amounts paid.
		Retirement.	Superannuation.	Guarantee.		
	St. Hyacinthe.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Benoit, L. V.	Salary as Inspector for year			1 80	98 20	98 20
	Fredericton.					
Fowler, J. D.	Salary as Inspector for year			3 60	196 40	196 40
	St. John.					
Wilson, J. E.	Salary as Inspector for year			3 60	1,096 40	
	Contingencies				93 16	
						1,189 56
	Halifax.					
Miller, A.	Salary as Inspector for year		25 04	3 60	1,221 36	
Ritchie, A. J.	" Assistant Inspector for year			1 80	648 12	
Munro, H. D.	" " "		1 96	1 80	96 24	
	Salaries		27 00	7 20	1,965 72	
	Contingencies				801 25	
						2,766 97
	Charlottetown.					
Bell, J. H.	Salary as Inspector for year			3 60	353 89	
	Contingencies				52 43	
						406 32
	Winnipeg.					
Magness, R.	Salary as Inspector for year			3 60	296 40	
	Contingencies				145 25	
						441 65
	Nanaimo.					
McAloney, J. A.	Salary as Inspector for year			3 60	96 40	96 40
	New Westminster.					
Wolfenden, W.	Salary as Inspector for year	5 00		3 60	91 40	91
	Vancouver.					
Miller, J. E.	Salary as Inspector for year		6 00	3 60	290 40	
	Contingencies				146 90	
						437 30
	Victoria.					
Jones, R.	Salary as Inspector for year		4 00	3 60	192 40	
	Contingencies				1 40	
						193 80

APPENDIX B—*Continued.*

No. 6.—DETAILS of Gas Inspection Expenditures for the Year ended June 30, 1904.

To whom paid.	Service.	Amounts paid.	Totals.
	General Contingencies.	$ cts.	$ cts.
Stevenson, George	Balance on 2 meters.	628 00	
"	For repairing 12 new discs for A. Aubin, photometers.	41 09	
Webster, Jas. S	For concrete foundation laid in Galt gas office	5 50	
McAuslan, A.	Materials furnished and carpenters work for Galt gas office	8 25	
Goodfellow, B	For painting floor and meter prover in Galt gas office.	5 00	
Scott & Bennett	Repairing meter prover in Galt gas office	8 60	
The Pritchard & Andrews Co	Paid for rubber cement and 2 sets of bands for model daters	1 50	
American Meter Co	3 test meters complete and commission on draft.	90 25	
Canadian Rubber Co	Rubber tubing, &c	110 31	
Dingwall, D. R., Ltd	Cleaning photometer clock	1 00	
McKay, W. J	Material furnished and 7½ hours time	6 50	
Cotter Bros.	Solder and 18 hours time	11 10	
Stevenson, Geo	Repairs to apparatus	283 61	
Proctor, G. A.	Material and labour.	6 60	
Joss, Alexander.	"	43 85	
Bowman, R.	7 hours time repairing, &c.	2 45	
Hymmen, P.	Material and labour.	8 26	
Chislett, W. R.	"	18 09	
Millward, G. W	"	35 29	
Homan, W. S.	"	9 30	
Cole & McMurray	"	25 34	
Canadian Express Co.	Express charges	1 00	
Canadian Pacific Railway Co.	Freight charges	4 63	
Dominion Express Co.	Express charges	0 65	
	Total general contingencies		1,356 17
	Grand total		24,564 50
	ADD—Printing	378 43	
	Stationery	157 24	
			535 67
	Authorized disbursements (less superannuation retirement and guarantee)		25,100 17
	ADD—Balances due by Inspectors, June 30, 1904.		212 88
			25,313 05
	LESS—Balances due by Inspectors, July 1, 1903.		212 88
	Actual disbursements agreeing with statement No. 22, page 58		25,100 17

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

APPENDIX B—*Continued.*

No. 7.—DETAILS of Electric Light Inspection, Expenditures for the Year ended June 30, 1904.

To whom paid.	Service.	Deduction for Guarantee	Amounts paid.	Total Amounts paid.
	Belleville.	$ cts.	$ cts.	$ cts.
Johnson, W	Contingencies			304 51
	Hamilton.			
McPhie, D	Contingencies			112 80
	London.			
Nash, A. F	Contingencies			166 90
	Ottawa.			
Roche, H. G	Contingencies			93 80
	Toronto.			
Johnstone, J. K	Contingencies			260 94
	Montreal.			
Aubin, A	Contingencies			396 22
	Quebec.			
Le Vasseur, N	Contingencies			41 06
	Sherbrooke.			
Simpson, A. F	Contingencies			72 79
	St. Hyacinthe.			
Provost, I	Salary as Inspector for the year	1 80	298 20	
	Contingencies		45 70	
				343 90
	Three Rivers.			
Dufresne, J. U	Salary as Inspector for the year	0 07	499 93	
	Contingencies		65 95	
				565 88
	St. John.			
Wilson, J. E	Contingencies			183 37
	Halifax.			
Millar, A	Contingencies			200 65
	Charlottetown.			
Bell, J. H	Contingencies			34 81
	Winnipeg.			
Magness, R	Contingencies			11 65
	Victoria.			
Jones, R	Contingencies			20 05
	General.			
Higman, O	Salary as Chief Electrical Engineer for the year		2,400 00	
Fontaine, A	Salary as assistant to the Chief Electrical Engineer for the year		731 12	
	Contingencies		262 40	
				3,393 52

APPENDIX B—*Continued.*

No. 7.—DETAILS of General Electric Light Inspection, Expenditures for the Year ended June 30, 1904—*Concluded.*

To whom paid.	Service.	Amounts paid.	Totals.
	General Contingencies.	$ cts.	$ cts.
Hearn & Soper	Electrical supplies, material, repairs, &c.	1,181 05	
Weston Electrical Instrument Co	" " "	85 01	
Shedrick, C. E	Repairs to electrical apparatus	26 65	
Williams & Wilson	1 drilling machine fitted with check	50 00	
Forman, John	15 Sangano testing sets	42 00	
Canadian Rubber Co	2 yards rubber matting	10 35	
Thornton & Truman	Belting pullies, shafting, machinist time, &c	136 43	
The Ottawa Electric Co	1 Nerust lamp and 1 portable lamp	13 65	
Eastern Carbon Works	50 carbon plates	4 91	
The Pritchard & Andrews Co	1 model dater	2 00	
Garioch, Godard Co	Binding posts knife switches	66 60	
Dominion Express Co	Express charges	21 35	
Canadian Express Co	"	33 36	
American Express Co	"	3 00	
Canadian Pacific Ry	Freight charges	1 40	
Potvin, N	Petty expenses	1 25	
	Total general contingencies		1,679 01
	Grand total		7,881 77
	ADD—Printing	123 62	
	Stationery	39 74	
			163 36
	Actual disbursements, agreeing with statement No. 24, page 61		8,045 13

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1901.

SESSIONAL PAPER No. 12

APPENDIX B—*Continued.*

No. 8.—List of Persons employed by the Inland Revenue Department on Salary, during the Year ended June 30, 1903-1904.

Names.	Services.						
	Inside.	Excise.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food Inspection.
Adams, J. S.		1					
Alexander, Thos		1					
Allen, G. A		1					
Alteman, Peter J		1					
Amor, Wm		1					
Andrews, A. A		1					
Armstrong, Walter		1					
Aubin, A				1	1		
Baby, W. A. D		1					
Baikie, D		1					
Baker, J. S			1				
Barber, J. S		1					
Barnes, G		1					
Barrett, J. K		1					
Barry, James			1				
Bayard, Gilbert A		1					
Beaulac, J. H			1				
Beaulieu, J. B		1					
Belair, A. (Plessis dit)		1					
Bell, J. H				1	1		
Belleperche, A. J. E		1					
Belyea, T. H		1					
Beneteau, S		1					
Bennett, James		1					
Benoit, L. V		1		1			
Bernard, N. J. D		1					
Bernier, J. A			1				
Berry, H. L		1					
Bickle, J. W		1		1			
Bish, Philip		1					
Bishop, J. B		1					
Blackman, C		1					
Blais, J. C. F		1					
Blethen, C. W		1					
Blyth, Alex		1					
Bolduc, Ephrem			1				
Bonner, J. D					1		
Boomer, J. B		1					
Boudet, E			1				
Bourassa, Joseph		1					
Bourget, L. J			1				
Bourget, O		1					
Bousquet, J. O		1					
Bouteiller, G. A		1					
Bowman, Allan		1					
Boyd, J. F. S		1					
Boyd, S. I		1					
Boyle, P		1					
Bowen, F. C		1					
Brabant, J. B. G. N		1					
Brain, A. F		1					
Breen, John			1				
Brennan, D. J		1					
Brennan, John		1					
Brentnall, F. F		1					
Broadfoot, S		1		1			
Brown, W. J		1					
Browne, G. W		1					
Bruyère, H. P		1					

APPENDIX B—*Continued.*

No. 8.—List of Persons employed by the Inland Revenue Department, 1903-1904—*Continued.*

Names.	Services.						
	Inside.	Excise.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food Inspection.
Burgess, Thomas H			1				
Burke, T		1					
Burns, John	1						
Burns, R. J		1					
Cahill, J. H		1					
Cahill, J. W		1					
Cameron, D. M		1					
Campeau, F. R. E	1						
Cargill, W		1					
Carroll, D		1					
Carroll, F. P		1					
Carter, William	1						
Casey, John		1					
Caven, A		1					
Caven, W		1					
Chagnon, C. P		1					
Chalus, J. O			1				
Charbonneau, E	1						
Chartier, Etienne		1					
Cheseldine, J. H		1					
Chevrier, B	1						
Chilver, F. W		1					
Chisholm, J. J			1				
Chisholm, W. N		1					
Clark, James Alfred		1					
Clarke, Thomas		1					
Codd, Herbert J. S		1					
Code, Abraham		1					
Coleman, Charles		1					
Coleman, J. J		1					
Coles, F. H		1					
Collins, D			1				
Comte, L. A. A. J		1					
Conklin, W. M		1					1
Cook, W. R		1					
Costello, J. W			1				
Costigan, J. J		1					1
Coughlin, D			1				
Coulter, Alex		1					
Courtney, J. J		1					
Coutts, J. J		1					
Cowan, Edgar			1				
Crawford, W. P		1					
Dager, H. J		1					
Daignault, G		1					
Daoust, J. A			1				
Davelny, J. P		1					
David, T		1					
Davis, J		1					
Davis, T. G		1					
Davy, Edward			1				
Dawson, W		1					
Deland, A. N		1					
Dennis, W. A				1			
Desaulniers, J. E. A		1					
Dessert, Victor			1				
Dibblee, William		1					
Dick, J. W		1					
Dickson, C. T		1					

APPENDIX B—*Continued.*

No. 8.—List of Persons employed by the Inland Revenue Department, 1903-1904—*Continued.*

Names.	Services.						
	Inside.	Excise.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food Inspection.
Dingman, N. J		1					
Dixon, H. G. S		1					
Donaghy, William		1					
Doyle, B. J		1					
Doyon, J. A	1						
Dudley, W. H		1					
Dufresne, J. U					1		
Dumaine, J. D. E		1					
Dumbrille, R. W		1					
Dumouchel, Léandre		1					
Dunlop, C		1					
Dunne, J. P	1						
Duplessis, C. Z		1					
Dustan, W. M			1				
Dwyre, D. T		1					
Egan, Wm		1					
Egener, A		1					
Errett, R. W			1				
Evans, G. T		1					
Fahey, Ed		1					
Falconer, James		1					
Falconer, R. H		1					
Ferguson, John C		1					1
Findlay, R			1				
Findley, Hugh			1				
Fitzgerald, E. W			1				
Fitzpatrick, W. J		1					
Fletcher, R. W		1					1
Floody, E						1	
Flynn, D. J		1					
Fontaine, A					1		
Forest, E. R		1					
Forest, M		1					
Fortier, J. J. O		1					
Foster, J. Henry		1					
Fournier, L. A			1				
Fowler, George	1						
Fowler, J. D				1			
Fox, J. D		1					
Fox, Thomas		1					
Frame, Archibald			1				
Frankland, H. R		1					
Fraser, P		1					
Freed, A. T			1				
Freeland, Anthony		1					
Fyfe, James			1				
Gamache, J. H		1					
Gauvin, E		1					
Geldart, O. A		1					
George, John		1					
Gerald, C		1					
Gerald, W. H		1					
Gerald, W. J	1						
Gerow, W. M		1					
Gill, Wm		1					
Gillies, Archibald L		1					
Girard, Irené		1					
Girdlestone, R. J. M		1	1				
Goodman, A. W		1					

APPENDIX B—*Continued.*

No. 8.—List of Persons employed by the Inland Revenue Department, 1903-1904—*Continued.*

Names.	Services.						
	Inside.	Excise.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food Inspection.
Gorman, Arthur M.		1					
Gosnell, T. S		1					
Gow, J. E		1					
Graham, A. L.		1					
Graham, W. J.		1		1			
Graham, W. T.		1					
Grant, H. H		1					
Gravel, A. I.			1				
Grimason, Thomas.		1					
Grobois (de), Chas. B.		1					
Guay, Alphonse			1				
Hagan, James		1					
Hagarty, P		1					
Hagerty, B.	1						
Halliday, W. A	1						
Hanley, A.		1					
Harwood, J. O. A		1					
Harris, J. G.		1					
Harrison, W. F		1					
Hawkin, A. C.		1					
Hawkins, W. L.		1					
Hayhurst, T. H		1					
Hayward, W. J.			1				
Hébert, C. D		1					
Hébert, J. A. P.			1				
Helliwell, H. N		1					
Henderson, W		1					
Henwood, George		1					
Hesson, C. A		1					
Hicks, W. H		1		1			
Higman, O					1		
Himsworth, Wm.	1						
Hinchey, E. H.		1					
Hobbs, G. N.		1					
Hodder, W. E.		1					
Howard, W. W. S.		1					
Howden, R.		1					
Howell, Thomas.		1					
Howie, A.		1					
Hubley, H. H		1					
Hudon, L. E.	1						
Hughes, Henry			1				
Hughes, P. A	1						
Hughes, R. A.			1				
Hurst, Levi B		1					
Iler, B.		1					
Ironside, G. A		1					
Irwin, Robert.		1					
Irwin, Samuel			1				
James, T. C.		1					
Jameson, S. B.		1					
Jamieson, R. C.		1					
Jarvis, Henry.			1				
Johnson, C. W.				1			
Johnson, J. J.		1					
Johnson, Wm.			1	1	1		
Johnstone, J. K				1	1		
Jones, Andrew.		1					
Jones, Richard.		1		1	1		

SESSIONAL PAPER No. 12

APPENDIX B—*Continued.*

No. 8.—List of Persons employed by the Inland Revenue Department, 1903-1904—*Continued.*

Names.	Services.						
	Inside.	Excise.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food Inspection.
Jubenville, J. P.		1					
Kearny, D. J.		1					
Keeler, G. S.		1					
Keilty, T.		1					
Kelly, Daniel			1				
Kelly, J. F.						1	
Kelly, M. J.			1				
Kenning, J. H.		1					
Keogh, P. M.		1					
Kidd, Thomas							1
Kilroy, E. T.		1					
King, R. M.		1					
Knowles, C.			1				
Labelle, L. V.		1					
Laidman, Richard H.			1				
Lambert, J. A.		1					
Lamoureux, J. A.		1					
Lane, T. M.		1					
Laporte, Geo.		1					
LaRiviere, A. C.		1					
LaRue, A. P.		1					
LaRue, George		1					
LaRue, J. B. Alexandre		1					
Laurier, J. L.		1					
Lawless, E. M.	1						
Lawlor, H.		1					
Lawlor, John J.		1					
Lawrence, G. C.			1				
LeBel, J. A. W.			1				
Lee, Edward.		1					
LeMoine, Jules		1					
Lépine, Louis		1					
LeVasseur, N.				1	1		
Logan, John		1					
Long, W. H. A.		1					
Lyons, E.		1					
Macdonald, A. B.		1					
Macdonald, J. A.			1				
Macfarlane, Thos.							1
MacKenzie, J. H.		1					
Mager, Joseph G.			1				
Magness, Robt.			1	1	1		
Mahoney, H.		1					
Mainville, C. P.		1					
Male, Thomas				1			
Malo, T.		1					
Maranda, N. A.		1					
Marcon, F. E.		1					
Marentette, Alex.			1				
Marin, L. H.		1					
Marion, H. R.		1					
Marshall, I. N.		1					
Mason, F.		1					
Maurice, E.		1					
Metcalf, W. F.		1					
Melville, T. R.		1					
Michon, A. E.		1					
Miller, A.				1	1		
Miller, J. E.		1		1	1		

APPENDIX B—*Continued.*

No. 8.—List of Persons employed by the Inland Revenue Department, 1903–1904—*Continued.*

Names.	Services.						
	Inside.	Excise.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food Inspection.
Miller, W. F		1					
Millier, Elie		1					
Milligan, R. J.			1				
Milliken, E		1					
Moore, T		1					1
Moreau, A		1					
Morin, J. P			1				
Moreau, J. A			1	1			
Mulhern, M. M		1		1			
Munro, H. D		1		1			
Murdoch, James			1				
Murphy, Jas. L		1					
Murray, A. E		1					
Murray, David		1					
McAloney, Joseph A		1	1	1			
McArthur, G. H		1					
McCloskey, J. R		1					
McCoy, Wm		1					
McCraney, H. P		1					
McCuaig, Aug. F		1					
McCullough, A	1						
McCutcheon, H		1					
McDonald, A. J		1					
McDonald, A. W			1				
McDonald, J			1				
McFarlane, J			1				
McFee, C		1					
McGill, A							1
McGuire, T		1					
McLenaghan, N		1					
McNiven, J. D		1					
McPhie, Donald				1	1		
McPhie, W. H				1			
McSween, James		1					
Nash, A. F				1	1		
Neil, James		1					
Nash, S. C		1					
Newby, F	1						
Nichols, J. T		1					
Nooman, H. T		1					
Normandin, G		1					
O'Brien, E. C		1					
O'Brien, James		1					
O'Brien, J. F		1					
O'Donnell, J		1					
O'Donnell, M. J		1					
O'Donohue, M. J		1					
O'Flaherty, E. J		1					
O'Flaherty, M. J				1			
O'Leary, T. J		1					
Orr, Henry N		1					
Osborne, F. A		1					
O'Sullivan, D		1					
Panneton, G. E		1					
Pape, James				1	1		
Parent, F		1					
Parker, Thomas			1				
Parkinson, Edward B		1					1
Parson, C. H		1					

APPENDIX B—*Continued.*

No. 8.—List of Persons employed by the Inland Revenue Department, 1903-1904—*Continued.*

Names.	Services.						
	Inside.	Excise.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food Inspection.
Patry, J. H.		1					
Patterson, C. E. A.		1					
Pelletier, N. G.		1					
Petit, J. B.			1				
Poirier, J. N.		1					
Pole, C. W.		1					
Portelance, P. A.		1					
Potvin, Napoléon	1						
Powell, J. B.		1					
Power, J. F.		1					
Préfontaine, F. H.			1				
Prosser, Elijah.						1	
Provost, L. E.					1		
Quain, Redmond	1						
Quinn, J. D.		1					
Ralston, T.		1					
Renaud, A. H.		1					
Rennie, George		1		1			
Ridgman, A. H.		1					
Rinfret, C. I.		1					
Ritchie, A. J.				1			
Ritchie, R.		1					
Robins, S. W.			1				
Roche, H. G.				1	1		
Rork, T.		1		1			
Ross, H. E.		1	1				
Rouleau, J. C., jr.		1					1
Rousseau, Elzéar H.		1					
Rowan, W. E.		1					
Roy, L. G.	1						
Rudkins, W.		1		1	1		
Ryan, Wm.		1					
Saucier, X.		1					1
Schram, R. L. H.		1					
Scullion, W. J.		1					
Shanacy, M.		1		1			
Shaw, J. F.	1						
Simpson, A. F.		1		1	1		
Simpson, W. A.		1					
Simon, E. H.		1					
Slattery, R.		1					
Slattery, Thomas			1				
Sloan, W.		1					
Smith, J. C.			1				
Snowdon, J. W.		1					
Sparling, J. W.		1					
Spence, F. H.		1					
Spereman, J. J.		1					
Standish, J. G.		1					
Stevens, D. B.		1					
Stewart, James		1					
St. Michel, F. X.		1					
Stratton, W. C.		1					
Stuart, W. E.				1			
Swannell, F. W.		1					
Talbot, John.		1					
Taylor, G. W.		1					
Tétreault, J.		1					
Thomas, J. S.			1				

APPENDIX B—*Continued.*

No. 8.—List of Persons employed by the Inland Revenue Department, 1903–1904—*Continued.*

Names.	Services.						
	Inside.	Excise.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food. Inspection.
Thomas, Robert		1					
Thorburn, J		1					
Till, T. M		1					
Tomlinson, W. M			1				
Tompkins, P		1					
Toupin, F. X. J. A		1					
Tracy, J. P		1					
Trasher, W. A		1					
Valin, J. E	1						
Verner, Francis		1					
Verner, Thomas H		1					
Wainright, F. G		1					
Walker, J. H		1					
Walsh, Daniel J		1					
Wardell, R. S. R		1					
Watson, W. W		1					
Waugh, R. J			1				1
Webbe, C. E. A		1					
Westman, T	1						
Weyms, C		1					
Wheatley, Alfred E			1				
White, J. B		1					
Whitehead, J. P		1					
Whyte, J. A				1			
Wilson, David		1					
Wilson, J. E				1	1		
Winsor, John A			1				
Wolfenden, William		1		1			
Wood, James A		1					
Woodward, G. W		1					
Wright, Robert J			1				
Wright, S. E							1
Yetts, R. P	1						
Young, R. E		1					
Totals	24	326	67	37	21	6	13

SESSIONAL PAPER No. 12

APPENDIX B—*Continued.*

No. 9.—List of persons employed by the Inland Revenue Department on salary during a portion of the year ended June 30, 1904.

Names.	Period.	Services.						
		Inside.	Excise.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Adulteration of Food.
Adam, A. R.	From January 1, 1904 to June 30, 1904		1					
Auger, L. H.	February 23, 1904 to June 30, 1904		1					
Behan, J. J.	July 1, 1903 to August 6, 1903			1	1	1		
Bouchette, R. E.	July 1, 1903 to December 12, 1903	1						
Bourgeault, Alp.	July 1, 1903 to January 18, 1904	1						
Bourgeois, J. E.	December 29, 1903 to June 30, 1904	1						
Brodeur, P. E. S.	December 18, 1903 to June 30, 1904	1						
Chateauvert, G. E.	December 12, 1903 to June 30, 1904	1						
Clark, A. F.	July 1, 1903 to October 12, 1903		1					
Courchesne, J. H.	March 19, 1904 to June 30, 1904		1					
Crevier, J. H.	December 29, 1903 to June 30, 1904		1					
Daignault, G.	July 1, 1903 to April 30, 1904		1					
Desmarais, H. F.	May 1, 1904 to June 30, 1904		1					
Doyle, E. F.	December 12, 1903 to June 30, 1904	1						
Earl, R. W.	January 21, 1904 to June 30, 1904		1					
Elliott, T. H.	July 1, 1903 to September 30, 1903			1				
Fiddes, James	December 2, 1903 to June 30, 1904		1					
Fielding, Laura G.	January 1, 1904 to June 30, 1904		1					
Fortier, V.	July 1, 1903 to September 30, 1903		1					
Garneau, H.	April 11, 1904 to June 30, 1904	1						
Gervais, S.	July 1, 1903 to April 30, 1904			1				
Gilby, W. F.	January 1, 1904 to June 30, 1904			1				
Goodhue, M. L. E.	December 19, 1903 to June 30, 1904	1						
Guay, G. N.	July 1, 1903 to May 31, 1904			1				
Hart, P. D.	July 1, 1903 to January 31, 1904		1					
Hogan, James	July 28, 1903 to June 30, 1904		1					
Hunter, W. M.	June 8, 1904 to June 30, 1904				1	1		
Jeffrey, A. J.	January 11, 1904 to June 30, 1904		1					
Johnston, G. E.	July 1, 1903 to October 31, 1903		1					
Keay, W. S.	October 3, 1903 to June 30, 1904		1					
Kenny, John	November 1, 1903 to June 30, 1904		1					
Ladouceur, J.	March 9, 1904 to June 30, 1904							1
Langelier, François	March 15, 1904 to June 30, 1904		1					
Leblanc, F. X.	October 16, 1903 to June 30, 1904			1				
Ledoux, Alexina	January 1, 1904 to June 30, 1904		1					
Lévesque, H.	July 1, 1903 to March 31, 1904							1
Longtin, H.	March 14, 1904 to June 30, 1904		1					
McFarland, C. D.	July 1, 1903 to November 3, 1903		1					
McGuire, L. J.	February 23, 1904 to June 30, 1904		1					
McKay, R.	September 7, 1903 to June 30, 1904			1				
McPherson, E. A.	December 28, 1903 to June 30, 1904		1					
Popham, F. H.	April 16, 1904 to June 30, 1904		1					
Richard, D.	July 1, 1903 to August 31, 1903			1				
Rose, John A.	April 16, 1904 to June 30, 1904		1					
Sangster, F. H.	July 13, 1903 to June 30, 1904		1					
Scott, Jos.	March 1, 1904 to June 30, 1904			1				
Timmons, P.	July 1, 1903 to September 30, 1903		1					
Timmons, R.	October 12, 1903 to June 30, 1904		1					
Thrasher, W. A.	June 1, 1904 to June 30, 1904				1			
Tobin, Thomas.	July 16, 1903 to June 30, 1904		1					
Trumpour, G.	January 1, 1904 to June 30, 1904	1						
Waller, J.	July 1, 1903 to February 29, 1904		1					
Walsh, W. H.	October 14, 1903 to June 30, 1904		1					
Watson, V. M.	December 12, 1903 to June 30, 1904	1						
Weir, James	July 1, 1903 to December 31, 1903		1					
Wiallard, R. A.	April 11, 1904 to June 30, 1904	1						
Wellan, T. E.	December 17, 1903 to June 30, 1904		1					
	Totals	11	33	9	3	2	0	2

APPENDIX B—*Concluded.*

No. 9—List of Persons employed by the Inland Revenue Department on Salary, during the Year ended June 30, 1904—*Concluded.*

RECAPITULATION.

Employed during the year	447
" a portion of the year	57
Total	504

Services.

Employed in the Inside Service	35
" Excise	336
" Weights and Measures	70
" Gas	10
" Electric Light Inspection	4
" Preventive Service	2
" Food Inspection	6
" Excise, Weights and Measures, and Gas	1
" " and Gas	11
" " and Food Inspection	8
" Weights and Measures and Gas	2
" " " and Food Inspection	1
" Gas and Electric Light	10
" Excise, Gas and Electric Light	4
" Weights, and Measures, Gas and Electric Light	3
" " " and Excise	1
Total corresponding with above	504

W. J. GERALD,
Deputy Minister.

Inland Revenue Department,
Ottawa, August 19, 1904.

INDEX

REPORT, RETURNS AND STATISTICS

OF THE

INLAND REVENUES

OF THE

DOMINION OF CANADA

FOR THE FISCAL YEAR ENDED JUNE 30

1904

PART II

INSPECTION OF WEIGHTS AND MEASURES, GAS AND ELECTRIC LIGHT

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
PRINTED BY S. E. DAWSON, PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1904

[No. 13—1904.]

REPORT

OF THE

DEPUTY MINISTER OF INLAND REVENUE

ON THE

INSPECTION OF WEIGHTS AND MEASURES, GAS AND ELECTRIC LIGHT

To the Honourable
The Minister of Inland Revenue.

SIR,—I have the honour to submit herewith my annual report on the inspection of weights and measures, gas and electric light, with the usual statements in connection therewith, for the fiscal year ended June 30, 1904.

1. The total revenue collected during the year for the inspection of weights and measures was $66,355.19, as against $64,327.65 collected during the year ended June 30, 1903.

2. The total expenditure was $84,768.82 as against $87,507.60 expended during the year ended June 30, 1903.

3. Appendix 'A' gives a summary statement of the receipts and expenditures of each inspection division.

4. In Appendices 'B' 'C' and 'D' will be found a detailed statement of weights, measures and weighing machines presented for verification, verified and rejected during the year. The number of all descriptions may be summarily stated as follows:—

	Presented.	Verified.	Rejected.	Percentage of Rejections.
Weights, Dominion	57,757	57,186	571	0·98
Measures of capacity, Dominion	96,438	96,324	114	0·10
Lineal measures	7,950	7,836	114	1·43
Balances, equal arms	11,402	11,180	222	1·69
" steelyards	4,497	4,405	92	0·20
" platform scales	37,454	36,564	890	2·10
Miscellaneous weights	692	686	6	0·89
" measures of capacity	1,454	1,438	16	1·10
" balances	9,467	9,413	54	0·59

Inspection of Gas.

5. The total revenue collected during the fiscal year ended June 30, 1904, for the inspection of gas and gas meters, was $26,960, as compared with $25,159.80 collected during the year ended June 30, 1903.

6. The total expenses were $25,379.15, as against $25,566.68 expended during the year ended June 30, 1903.

7. Appendix 'E' gives a summary statement of the receipts and expenditures of each gas inspection district.

8. A statement of the illuminating power and purity of gas inspected during the year will be found in Appendix 'F.'

9. The illuminating power, where inspection has been made has been as follows :—

Places.	Number of Tests made.	Number of times below Standard.	Places.	Number of Tests made.	Number of times below Standard.
Barrie	12	1	Stratford	11	1
Belleville	20		St. Catharines	12	
Berlin	12		St. Thomas	12	
Brantford	12		Toronto	104	
Brockville	12		Windsor	16	3
Chatham	14		Woodstock	12	3
Cobourg	11		Montreal	104	
Cornwall	12		Quebec	12	
Deseronto	10		Sherbrooke	12	
Dundas	12		St. Hyacinthe	12	
Galt	12		Fredericton	59	1
Guelph	12		Moncton	12	
Hamilton	24		St. John, N.B.	58	
Ingersoll	12	3	Halifax	12	
Kingston	9		Pictou	12	
Listowel	11		Yarmouth	12	
London	25		Charlottetown	17	
Napanee	12	1	Winnipeg	12	
Ottawa	24		Nanaimo	12	
Owen Sound	12		New Westminster	12	
Peterborough	25	3	Vancouver	12	
Port Hope	12		Victoria	11	
Sarnia	10				

The revenue derived from the inspection of electric light was as follows:

Fees for inspection of meters, &c.	$18,823 75
Registration of companies	4,435 00
	$23,258 75
The expenses of inspection (annual)	6,204 63
	$17,054 12
Expended on standard instruments, &c.	1,842 37
Leaving a net revenue of	$15,211 75

Since the year 1896-97 the two services of gas and electric light inspection, which are conducted largely by the same staff of officers, have reached that point at which they have ceased to be a burden upon the general taxpayer, as shown below:—

Years.	Gas and Electric Light.	
	Revenue.	Expenditure.
	$ cts.	$ cts.
1899-1900	35,523 50	26,424 48
1900-01	37,536 57	28,247 20
1901-02	45,663 05	33,328 48
1902-03	49,054 55	36,096 47
1903-04	50,218 75	33,426 15

* Exclusive of cost of standard instruments.

The kindred service of weights and measures inspection, it will be observed, earns about four-fifths of its annual cost, the expenditure as already stated having been $84,768.82, against a revenue of $66,355.19.

In my report of last year I referred to the fact that the Chief Inspector of Weights and Measures had visited the inspection districts in the eastern portion of the Dominion, and that, during the year just closed, he would be able to visit the remaining districts.

This has now been done, all districts having been visited except the Yukon, and the Department is of the opinion that a much greater efficiency will result from the inspection made and the instructions given.

Sample sets of metric weights and measures are still being supplied to educational institutions throughout the country. Up to the present time nearly 450 of these sets have been sent out from the Department.

I have the honour to be, sir,
Your obedient servant,

W. J. GERALD,
Deputy Minister.

Inland Revenue Department,
Ottawa, August 19, 1904.

APPENDIX A.

STATEMENT of Weights and Measures Expenditures and Receipts for the Year ended June 30, 1904.

Divisions.	Inspectors.	Expenditures. Salaries.	Special Assistance.	Rent.	Travelling Expenses.	Sundries.	Total.	Receipts.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Belleville. .	Johnson, Wm ..... Slattery, T .. ... Irwin, S..... ..... Errett, R. W..... Johnston, Chs. W.. Gallagher, F.....	2,908 02	666 35	345 00	1,158 75	578 26	5,656 38	3,352 05
Hamilton.....	Freed, A. T. .. McDonald, J..... Marentette, A..... Fitzgerald, E. W.. Laidman, R. H.... Wheatley, E. A.... Jarvis, H .. .. .. Robins, S. H ...	6,699 76	.....	... ...	1,263 96	111 12	8,074 84	8,781 48
Ottawa...	Macdonald, J. A .. Elliott, T. H ..... McFarlane, Jas.. . . Breen, J..... ... Winsor, J... ..... Findley, Robt..... Scott, Jos..... ..	4,316 40	308 18	250 00	1,232 67	200 23	6,307 48	8,587 65
Toronto... ..	Kelly, D .... Milligan, R. J... . Wright, R... . ... Murdoch, J.. .. . Smith, J. C.....	4,299 80	....		1,707 42	154	161 68	6,834 12
Windsor.....	Hayward, W. J.... Coughlin, D.... . Thomas, J. S. .. Hughes, R. A	3,799 76	....		1,654 73	199 03	5,653 2	9,540 74
	Ontario..... ..	22,023 74	974 53	595 00	7,017 53	1,243 10	31,853 90	37,096 04

APPENDIX A—*Continued.*

STATEMENT of Weights and Measures Expenditures and Receipts for the Year ended June 30, 1904.—*Continued.*

Divisions.	Inspectors.	Expenditures. Salaries.	Special Assistance.	Rents.	Travelling Expenses.	Sundries.	Totals.	Receipts.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Montreal.....	Chalus, J. O .... Daoust, J. A..... Gervais, S..... Hébert, J. A. P... Boudet, E..... Collins, D... ..... Baker, J. S.. ..... Dessert, V.....	6,866 28	.....	126 75	1,278 48	333 37	8,604 88	9,363 38
Quebec.	Guay, Geo. N..... LeBel, J. A. W... Kelly, M. J..... Guay, Alph. ... Petit, J. B..... Préfontaine, R .... Knowles, Chas .... Bourget, L. J. ... Moreau, A.....	6,449 76	.....	.....	1,532 03	257 49	8,239 28	3,701 35
St. Hyacinthe.	Morin, J. P. .... Tomlinson, W. M.. Fournier, L. A. .. Beaulac, J. H..... Thérien, J. F.....	2,849 88	499 92	.....	1,234 20	94 65	4,678 65	2,893 59
Three Rivers .	Gravel, A. I. .... Beaulac, J. H ..... Bolduc, E.....	1,549 92	.....	.....	691 71	9 66	2,251 29	1,445 59
	Quebec.....	17,715 84	499 92	126 75	4,736 42	695 17	23,774 10	17,403 91
St. John.....	Barry, Jas..... Cowan, E ..... Richard, D..... Bérnier, J. A .... Leblanc, F. X.....	2,954 78	.....	.....	458 56	106 44	3,519 78	2,168 70
Cape Breton..	Laurence, G. C.....	850 00	.....	50 00	394 45	20 33	1,314 78	637 11
Halifax.	Frame, A. ..... Waugh, R. J..... Sargent, W..	1,599 96	799 92	300 00	461 68	174 70	3,336 26	1,183 41
Pictou.....	Dustan, W. M. ... Chisholm, J. J	1,649 92	.....	.....	152 41	69 80	1,872 13	444 65
	Nova Scotia.....	4,099 88	799 92	350 00	1,008 54	264 83	6,523 17	2,265 17
Charlottetown P.E.I.	Davy, E..... Hughes, H	1,549 92	.....	.....	154 41	79 74	1,784 07	378 63

SESSIONAL PAPER No. 13

APPENDIX A—*Concluded.*

STATEMENT of Weights and Measures Expenditures and Receipts for the year ended June 30, 1904.—*Concluded.*

Divisions.	Inspectors.	Expenditures. Salaries.	Special Assistance.	Rent.	Travelling Expenses.	Sundries.	Total.	Receipts.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Winnipeg, Man.	Magness, R. McDonald, A. W. Girdlestone, R. J. M. Ross, H. E McKay, R. Gilby, W. F.	3,921 39	378 31	.....	1,579 41	138 60	6,017 71	5,269 49
Calgary, N.W.T.	Saucier, X. Costello, J. W.	949 92	.....	.....	323 30	.....	1,273 22	753 20
Victoria, B.C.	Findley, H. McAloney, J. A. Parker, Thos.	1,849 80	.....	180 00	1,484 86	122 95	3,637 61	1,020 05

RECAPITULATION.

Ontario	22,023 74	974 53	595 00	7,017 53	1,243 10	31,853 90	37 096 04
Quebec	17,715 84	499 92	126 75	4,736 42	695 17	23,774 10	17,403 91
New Brunswick	2,954 78	.....	.....	458 56	106 44	3,519 78	2,168 70
Nova Scotia	4,099 88	799 92	350 00	1,008 54	264 83	6,523 17	2,265 17
Prince Edward Island	1,549 92	.....	.....	154 41	79 74	1,784 07	378 63
Manitoba	3,921 39	378 31	.....	1,579 41	138 60	6,017 71	5,269 49
North-west Territories	949 92	.....	.....	323 30	.....	1,273 22	753 20
British Columbia	1,849 80	.....	180 00	1,484 86	122 95	3,637 61	1,020 05
Chief inspector	2,500 00	.....	.....	629 85	16 30	3,146 15	
General contingencies	.....	.....	.....	.....	1,888 51	1,888 51	
Metric system	.....	.....	.....	.....	425 33	425 33	
Printing	.....	.....	.....	.....	746 97	746 97	
Stationery	.....	.....	.....	.....	178 30	178 30	
	57,565 27	2,652 68	1,251 75	17,392 88	5,906 24	84,768 82	66,355 19

W. J GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

APPENDIX

RETURN of Weights and Measures Inspected during the Fiscal Year ended June 30, each Division, for each Province

INSPECTION OFFICES.	WEIGHTS.									MEASURES OF CAPACITY.					
	Dominion.			Troy.			Miscellaneous			Dominion.			Miscellaneous		
	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.
Ontario.															
Belleville	2,226	2,226					1	1		8,296	8,296		12	12	
Hamilton	9,693	9,642	51				100	100		5,077	5,075	2	55	51	4
Ottawa	1,844	1,794	50							2,338	2,254	84	21	21	
Toronto	4,962	4,962								9,649	9,649		436	436	
Windsor	5,337	5,337								24,760	24,760				
Totals	24,062	23,961	101				101	101		50,120	50,034	86	524	520	4
Quebec.															
Montreal	10,674	10,568	106				85	85		23,421	23,409	12	348	348	
Quebec	7,790	7,441	349				475	470	5	6,816	6,808	8	56	56	
St. Hyacinthe	3,337	3,335	2							3,653	3,652	1	43	43	
Three Rivers	2,084	2,084					6	6		1,922	1,922		5	5	
Totals	23,885	23,428	457				566	561	5	35,812	35,791	21	452	452	
New Brunswick.															
St. John	3,962	3,962					8	8		4,974	4,974		199	199	
Nova Scotia.															
Cape Breton	494	481	13				1	1		390	387	3	28	27	1
Halifax	1,502	1,502					16	15	1	1,249	1,245	4	108	98	10
Pictou	453	453								604	604		39	38	1
Totals	2,449	2,436	13				17	16	1	2,243	2,236	7	175	163	12
Prince Edward Island.															
Charlottetown	462	462								124	124		1	1	
Manitoba.															
Calgary	318	318								514	514		10	10	
Winnipeg	2,109	2,109								2,500	2,500		93	93	
Totals	2,427	2,427								3,014	3,014		103	103	
British Columbia.															
Victoria	510	510								151	151				

B.

1904, showing the Total Number brought for Verification, Verified and Rejected, for and for the whole Dominion.

Measures of Length			Balances, &c.											
			Equal Armed.			Steelyards.			Platform Scales, Weigh Bridges, &c.			Miscellaneous.		
Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.
169	169	....	392	392	....	80	80	....	2,033	2,033	....	109	109	....
1,957	1,918	39	2,294	2,233	61	2,289	2,244	45	6,006	5,685	321	1,232	1,226	6
384	379	5	346	305	41	10	8	2	2,412	2,276	136	5,803	5,770	33
947	947	....	1,061	1,061	....	327	327	....	3,525	3,525	....	812	812	....
263	263	....	1,029	1,025	4	245	244	1	6,131	6,083	48	94	94	....
3,720	3,676	44	5,122	5,016	106	2,951	2,903	48	20,107	19,602	505	8,050	8,011	39
2,148	2,146	2	2,141	2,105	36	922	893	29	5,639	5,529	110	408	397	11
860	801	59	1,258	1,210	48	164	158	6	1,979	1,904	75	65	64	1
338	338	....	551	532	19	116	110	6	2,118	2,020	98	58	58	....
137	137	....	339	339	....	37	37	....	1,011	1,009	2	4	4	....
3,483	3,422	61	4,289	4,186	103	1,239	1,198	41	10,742	10,462	280	535	523	12
46	46	....	714	711	3	71	71	....	1,157	1,154	3	216	216	....
119	110	9	114	112	2	12	12	....	305	296	9	49	49	....
61	61	....	344	336	8	55	53	2	820	778	42	173	171	2
39	39	....	99	99	....	8	8	....	264	255	9	13	13	....
219	210	9	557	547	10	75	73	2	1,389	1,329	60	235	233	2
4	4	....	92	92	....	9	9	....	302	302	....	17	17	....
213	213	....	62	62	....	12	12	....	363	362	1	72	72	....
262	262	....	427	427	....	86	85	1	2,800	2,759	41	247	246	1
475	475	....	489	489	....	98	97	1	3,163	3,121	42	319	318	1
3	3	....	139	139	....	54	54	....	594	594	....	95	95	....

APPENDIX

RETURN of Weights and Measures Inspected during the Fiscal Year ended June 30, each Division, for each Province,

RECAPIT

INSPECTION OFFICES.	WEIGHTS.									MEASURES OF CAPACITY.					
	Dominion.			Troy.			Miscellaneous			Dominion.			Miscellaneous		
	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.
Ontario	24,062	23,961	101	....	....	....	101	101	....	50,120	50,034	86	524	520	4
Quebec	23,885	23,428	457	....	....	....	566	561	5	35,812	35,791	21	452	452	....
New Brunswick	3,962	3,962	....	....	....	....	8	8	....	4,974	4,974	....	199	199	....
Nova Scotia	2,449	2,436	13	....	....	....	17	16	1	2,243	2,236	7	175	163	12
Prince Edward Island	462	462	....	....	....	....	....	....	....	124	124	....	1	1	....
Manitoba	2,427	2,427	....	....	....	....	....	....	....	3,014	3,014	....	103	103	....
British Columbia	510	510	....	....	....	....	....	....	....	151	151	....	....	....	....
	57,757	57,186	571	....	....	....	692	686	6	96,438	96,324	114	1,454	1,438	16

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

B.—*Continued.*

1904, showing the Total Number brought for Verification, Verified and Rejected, for and for the whole Dominion.

ULATION.

Measures of Length.			Balances, &c.											
			Equal Armed.			Steelyards.			Platform Scales, Weigh Bridges, &c.			Miscellaneous.		
Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.
3,720	3,676	44	5,122	5,016	106	2,951	2,903	48	20,107	19,602	505	8,650	8,611	39
3,483	3,422	61	4,289	4,186	103	1,239	1,198	41	10,742	10,462	280	535	523	12
46	46	....	714	711	3	71	71	....	1,157	1,154	3	216	216	....
219	210	9	557	547	10	75	73	2	1,389	1,329	60	235	233	2
4	4	....	92	92	....	9	9	....	302	302	.....	17	17	....
475	475	....	489	489	....	98	97	1	3,163	3,121	42	319	318	1
3	3	....	139	139	....	54	54	...	594	594	.....	95	95	....
7,950	7,836	114	11,402	11,180	222	4,497	4,405	92	37,454	36,564	890	9,467	9,413	54

W. J. GERALD,
Deputy Minister.

APPENDIX

RETURN showing the Number of Dominion Weights and Lineal Measures of each Fiscal Year ended

DOMINION

INSPECTION DIVISIONS.	Avoir													
	60	50 lbs.	30 lbs.	20 lbs.	10 lbs.	7 lbs.	5 lbs.	4 lbs.	3 lbs.	2 lbs.	1 lb.	8 ozs.	4 ozs.	2 ozs.
Ontario.														
Belleville				1	9	27	100	165	290	430	357	246	210	175
Hamilton		48			2	6	348	173	1,746	2,636	2,567	508	438	430
Ottawa		80		2	14	53	93	123	322	336	252	203	147	96
Toronto				14	10	17	123	227	535	1,076	1,016	465	371	373
Windsor					9	1	104	244	479	1,080	1,007	550	511	495
Totals		128		17	44	104	768	932	3,372	5,558	5,199	1,972	1,677	1,569
Quebec.														
Montreal	365	269	7	8	46	26	539	451	772	1,822	1,847	1,234	1,067	946
Quebec		83	15	22	73	140	414	575	521	1,110	1,110	1,037	982	828
St. Hyacinthe				2	9	6	198	155	430	618	573	389	384	284
Three Rivers					2	7	149	137	266	360	337	281	268	165
Totals	365	352	22	32	130	179	1,300	1,318	1,989	3,910	3,867	2,941	2,701	2,223
New Brunswick.														
St. John				2	7	19	189	292	316	901	768	452	356	300
Nova Scotia.														
Cape Breton		22	1	10	15	26	68	38	117	107	61	19	6	3
Halifax			11	5	4	17	41	87	130	418	330	145	103	91
Pictou						2	7	17	64	111	103	35	31	30
Totals		22	12	15	19	45	116	142	511	636	494	199	140	124
Prince Edward Island														
Charlottetown							8	17	44	137	100	52	35	33
Manitoba.														
Winnipeg		27			6	2	33	73	220	500	438	156	137	137
North-west Territories														
Calgary						1	9	7	36	63	60	25	23	23
British Columbia.														
Victoria					2		5	23	18	146	128	75	41	29

SESSIONAL PAPER No. 13

C.

Denomination presented for Verification in each Inspection Division during the June 30, 1904.

Weights.									Lineal Measures.								
Avoirdupois.							Troy Weights.	Miscellaneous Weights.	6 feet.	5 feet.	1 yard.	½ yard.	2 feet.	1 foot.	½ foot.	100 feet chains.	66 feet chains.	Tape or Rifaud.	Total Number.	Miscellaneous Measures.
1 oz.	8 drs.	4 drs.	2 drs.	1 dr.	½ dr.	Total Number.														
129	66	14	5	2	....	2,226	...	1	...	...	169	...	...	...	...	...	...	..	169	.
409	262	88	13	18	1	9,693	..	100	...	...	1,957	...	...	...	...	...	...	...	1,957	..
67	35	14	6	1	...	1,844	....		...	....	384	..	...	...	...	...	...	...	384	..
335	199	125	31	54	....	4,962	...		...	....	947	..	...	...	...	...	...	...	947	.....
455	266	109	24	3	...	5,337	....		...	...	263	..	...	...	...	...	...	.	263	...
1,395	819	350	79	78	1	24,062	..	101	..	..	3,720	...	...	...	...	...	...	...	3,720	.
694	317	124	64	76	....	10,674	..	85	...	...	2,148	..	...	...	...	...	...	.	2,148	...
620	212	32	8	6	2	7,790	.	475	...	...	860	...	...	...	...	...	...	..	860	....
191	72	19	5	2	...	3,387	..	...	..	....	338	..	...	...	...	...	...	...	338	....
86	19	5	1	1	...	2,084	...	6	...	.	137	..	...	...	...	...	...	...	137	...
1,591	620	180	78	85	2	23,885	..	566	.	..	3,483	.	...	...	...	...	...	..	3,483	.....
224	96	39	1	..		3,962	..	8	...	..	46	.	...	...	...	...	...	...	46	.....
1	....	....	....	....	....	494	..	1	...	....	119	..	...	...	...	..	...	..	119	.....
71	36	12	1	.	..	1,502	....	16	..	...	61	..	...	...	...	...	...	...	61	...
25	14	8	2	4	....	453	...	...	..	..	39	..	...	...	...	...	...	...	39	...
97	50	20	3	4	..	2,449	..	17	...	....	219	..	...	...	...	...	...	.	219	.....
29	6	1	.	....	....	462	....	..	.	....	4	..	...	...	...	...	...	...	4	...
134	101	72	35	38	..	2,109	...	.....	....	....	262	...	...	...	...	...	...	...	262	...
23	21	15	4	8	....	318	..	...	...	1	206	6	...	...	..	...	...	...	213	....
27	11	5	...	....	....	510	....	...	...	.....	3	.	.....	...	.....	...	...	...	3	..

4-5 EDWARD VII., A. 1905

APPENDIX

RETURN showing the number of Dominion Weights and Lineal Measures of each Year ended

DOMINION

INSPECTION DIVISIONS.	Avoir													
	60 lbs.	50 lbs.	30 lbs.	25 lbs.	10 lbs.	7 lbs.	5 lbs.	4 lbs.	3 lbs.	2 lbs.	1 lb.	8 ozs.	4 ozs.	2 ozs.
Ontario.														
Belleville				1	9	27	100	165	290	430	357	246	210	175
Hamilton		48			2	6	348	169	1,743	2,628	2,557	501	432	425
Ottawa		80		2	13	51	83	116	307	232	245	202	146	95
Toronto				14	10	17	123	227	535	1,076	1,016	465	371	373
Windsor					9	1	104	244	479	1,089	1,007	550	511	495
Total		128		17	43	102	758	921	3,354	5,446	5,182	1,964	1,670	1,563
Quebec.														
Montreal	365	269	7	8	46	26	533	447	762	1,803	1,824	1,221	1,056	936
Quebec		73	15	22	69	132	395	540	497	1,049	1,049	978	944	808
St. Hyacinthe				2	9	6	198	154	430	618	573	389	384	283
Three Rivers					2	7	149	137	266	360	337	281	268	165
Total	365	342	22	32	126	171	1,275	1,278	1,955	3,830	3,783	2,869	2,652	2,192
New Brunswick.														
St. John				2	7	19	189	292	316	901	768	452	356	300
Nova Scotia.														
Cape Breton		22	1	10	13	25	66	38	117	104	56	19	6	3
Halifax			11	5	4	17	41	87	130	418	330	145	103	91
Pictou						2	7	17	64	111	103	35	31	30
Total		22	12	15	17	44	114	142	311	633	489	199	140	124
Prince Edward Island.														
Charlottetown							8	17	44	137	100	52	35	33
Manitoba.														
Winnipeg		27			6	2	33	73	220	500	438	156	137	137
North-west Territories														
Calgary						1	9	7	36	63	60	25	23	23
British Columbia.														
Victoria						2	5	23	18	146	128	75	41	

SESSIONAL PAPER No. 13

C—*Continued.*

Denomination, Inspected and Verified in each Inspection Division during the Fiscal June 30, 1904.

WEIGHTS.									LINEAL MEASURES.									
dupois.																		
1 oz.	8 drs.	4 drs.	2 drs.	1 dr.	½ dr.	Total Number.	Troy Weights.	Miscellaneous Weights.	6 feet.	5 feet.	1 yard.	½ yard.	2 feet.	1 foot.	½ foot.	100 feet chain.	66 feet chain.	Tape or Riband.	Total Number.	Miscellaneous Measures.
129	66	14	5	2	...	2,226	.....	1	.....	.....	169	..	..	..	..	..	..	..	169	.....
405	259	87	13	18	1	9,642	.....	100	.....	.....	1,918	..	..	..	..	..	..	..	1,918	.....
66	35	14	6	1	...	1,794	.....	.....	.....	.....	379	..	..	..	..	..	..	..	379	.....
335	190	125	31	54	....	4,962	.....	.....	.....	.....	947	..	..	..	..	..	..	..	947	.....
455	266	109	24	3	.	5,337	.....	.....	.....	.....	263	..	..	..	..	..	..	..	263	.....
1,390	816	349	79	78	1	23,961	.....	101	.....	.....	3,676	..	..	..	..	..	..	..	3,676	.....
686	315	124	64	76	...	10,568	.....	85	.....	.....	2,146	..	..	..	..	..	..	..	2,146	.....
610	212	32	8	6	2	7,441	.....	470	.....	.....	801	..	..	..	..	..	..	..	801	.....
191	72	19	5	2	....	3,335	.....	.....	.....	.....	338	..	..	..	..	..	..	..	338	.....
86	19	5	1	1	....	2,084	.....	6	.....	.....	137	..	..	..	..	..	..	..	137	.....
1,573	618	180	78	85	2	23,428	.....	561	.....	.....	3,422	..	..	..	..	..	..	..	3,422	.....
224	96	39	1	..	....	3,962	.....	8	.....	.....	46	..	..	..	..	..	..	..	46	.....
1	....	...	....	....	....	481	...	1	.....	.....	110	..	..	..	..	..	..	..	110	.....
71	36	12	1	.....	....	1,502	.....	15	.....	.....	61	..	..	..	..	..	..	..	61	.....
25	14	8	2	4	....	453	.....	.....	.....	.....	39	..	..	..	..	..	..	..	39	.....
97	50	20	3	4	....	2,436	.....	16	.....	.....	210	..	..	..	..	..	..	..	210	.....
29	6	1	..	....	....	462	.....	.....	.....	.....	4	..	..	..	..	..	..	..	4	.....
134	101	72	35	38	....	2,109	.....	.....	.....	.....	262	..	..	..	..	..	..	..	262	.....
23	21	15	4	8	....	318	.....	.....	.....	1	206	6	..	..	..	..	..	..	213	.....
27	11	5	..	....	...	510	.....	.....	.....	.....	3	..	..	..	..	..	..	..	3	.....

4-5 EDWARD VII., A. 1905

APPENDIX.

RETURN showing the number of Dominion Weights and Lineal Measures of each June 30,

DOMINION

Avoir

INSPECTION DIVISIONS.	60 lbs.	50 lbs.	30 lbs.	20 lbs.	10 lbs.	7 lbs.	5 lbs.	4 lbs.	3 lbs.	2 lbs.	1 lb.	8 ozs.	4 ozs.	2 ozs
Ontario.														
Belleville								4	3	8	10	7	6	5
Hamilton					1	2	10	7	15	4	7	1	1	1
Ottawa														
Toronto														
Windsor														
Total					1	2	10	11	18	12	17	8	7	6
Quebec.														
Montreal							6	4	10	19	23	13	11	10
Quebec		10			4	8	19	35	24	61	61	59	38	20
St. Hyacinthe								1						1
Three Rivers														
Total		10			4	8	25	40	34	80	84	72	49	31
New Brunswick.														
St. John					2	1	2			3	5			
Nova Scotia.														
Cape Breton														
Halifax														
Pictou														
Total														
Prince Edward Island														
Charlottetown														
Manitoba.														
Winnipeg														
North-west Territories.														
Calgary														
British Columbia.														
Victoria														

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

C—*Concluded.*

Denomination, Rejected in each Inspection Division during the Fiscal Year ended 1904.

Weight.									Lineal Measures.									
Avoirdupois.							Troy Weights.	Miscellaneous Weights.	6 feet.	5 feet.	1 yard.	½ yard.	2 feet.	1 foot.	½ foot.	100 feet chain.	66 feet chain.	Tape or Riband.	Total Number.	Miscellaneous Measures.
1 oz.	8 drs.	4 drs.	2 drs.	1 dr.	½ dr.	Total Number.														
4	3	1				51					39								39	
1						50					5								5	
5	3	1				101					44								44	
8	2					105					2								2	
10						349		5			59								59	
						2														
18	2					457		5			61								61	
						13					9								9	
								1												
								1												

W. J. GERALD,
Deputy Minister.

APPEN

RETURN showing the Number of Dominion Measures of Capacity, Balances and Weighing during the Fiscal Year

INSPECTION DIVISIONS.	MEASURES OF CAPACITY. Dominion. Bushel.	½ Bushel.	Peck.	Gallon.	½ Gallon.	Quart.	Pint.	½ Pint.	Gill.	½ Gill.	Total number.	Miscellaneous.	5 lbs. and under.
Ontario.													
Belleville	254	1,139	1,047	1,310	1,089	1,523	1,600	310	24	....	8,296	12	139
Hamilton	14	77	304	697	835	1,845	998	304	2	1	5,077	55	1,012
Ottawa	....	1	22	381	601	763	422	112	35	1	2,338	21	120
Toronto	388	111	184	1,551	1,310	2,898	2,796	368	27	16	9,649	436	462
Windsor	1,181	487	357	2,661	5,065	6,593	7,623	765	28	....	24,760	....	394
Totals	1,837	1,815	1,914	6,600	8,900	13,622	13,439	1,859	116	18	50,120	524	2,127
Quebec.													
Montreal	....	467	882	2,626	3,510	6,727	6,682	2,008	455	64	23,421	348	673
Quebec	....	258	196	1,071	1,681	1,597	1,325	520	166	2	6,816	56	156
St. Hyacinthe	....	94	107	606	945	980	667	215	38	1	3,653	43	116
Three Rivers	....	101	49	249	498	481	355	155	34	....	1,922	5	70
Totals	....	920	1,234	4,552	6,634	9,785	9,029	2,898	693	67	35,812	452	1,015
New Brunswick.													
St. John	....	151	333	884	1,386	1,201	858	175	6	....	4,974	199	176
Nova Scotia.													
Cape Breton	....	2	....	50	153	124	36	13	12	....	390	28	36
Halifax	....	30	19	178	376	314	212	97	16	7	1,249	108	95
Pictou	....	9	8	115	161	187	118	6	....	....	604	39	39
Totals	....	41	27	343	690	625	366	116	28	7	2,243	175	170
P. E. Island.													
Charlottetown	....	....	1	11	13	57	29	13	....	....	124	1	27
Manitoba.													
Winnipeg	16	3	2	381	708	701	507	181	1	....	2,500	93	110
N. W. Territories.													
Calgary	....	4	1	93	165	141	105	5	....	....	514	10	27
British Columbia.													
Victoria	....	....	1	16	30	82	21	1	....	....	151	....	86

SESSIONAL PAPER No. 13

DIX D.

Machines of each Denomination presented for Verification, in each Inspection Division, ended June 30, 1904.

BALANCES.

With equal arms.			Steelyards with divided arms.				Weigh Bridges or Platform Scales.							
6 lbs. to 50 lbs.	51 lbs. to 100 lbs.	101 lbs. and upwards.	500 lbs. and under.	501 lbs. to 1,000 lbs.	1,001 lbs. to 2,000 lbs.	2,001 lbs. and upwards.	250 lbs. and under.	251 lbs. to 500 lbs.	501 lbs. to 2,000 lbs.	2,001 lbs. to 4,000 lbs.	4,001 lbs. to 6,000 lbs.	6,001 lbs. and upwards.	Totals.	Miscellaneous.
253	...	.....	72	6	2	.....	639	169	805	165	60	195	2,505	109
1,282	...	...	2,246	40	2	1	3,070	103	2,213	257	82	281	10,589	1,232
226	.....	...	9	1	.....	.....	658	166	1,395	48	61	84	2,768	5,803
596	3	...	311	10	2	4	1,050	179	1,619	241	75	361	4,913	812
635	.....	.....	244	1	.....	.....	1,462	120	3,855	262	64	368	7,405	94
2,992	3	..	2,882	58	6	5	6,879	737	9,887	973	342	1,289	28,180	8,050
1,455	5	8	897	10	3	12	2,185	940	1,944	165	158	247	8,702	408
1,001	3	98	162	2	....	.....	789	667	436	18	11	67	3,401	65
435	.....	..	114	2	...	....	741	466	659	36	108	103	2,780	58
269	....	....	37	....	....	.	321	373	272	14	14	17	1,387	4
3,160	8	106	1,210	14	3	12	4,027	2,446	3,311	233	291	434	16,270	535
537	1	...	69	1	....	1	517	240	299	27	22	52	1,942	216
73	....	5	9	3	.....	....	165	41	44	3	6	16	431	.....
244	2	3	58	1	1	.	447	110	149	19	7	88	1,219	173
60	....	....	7	.....	1	...	106	54	51	5	15	33	371	13
377	2	8	69	4	2	...	718	205	244	27	28	167	2,021	186
65	.....	....	9	.....	.....	.....	91	50	130	9	8	14	403	17
317	....	...	81	3	2	....	723	35	690	267	638	447	3,313	247
35	....	...	11	..	1	.....	99	8	167	17	21	51	437	72
53	....	.....	41	6	7	...	283	14	221	22	7	47	787	95

APPENDIX

RETURN showing the Number of Dominion Measures of Capacity, Balances and Weighing during the Fiscal Year

INSPECTION DIVISIONS.	MEASURES OF CAPACITY. Dominion. Bushel.	½ Bushel.	Peck.	Gallon.	½ Gallon.	Quart.	Pint.	½ Pint.	Gill.	½ Gill.	Total Number.	Miscellaneous.	5 lbs. and under.
Ontario.													
Belleville	254	1,139	1,047	1,310	1,089	1,523	1,600	310	24	....	8,296	12	139
Hamilton	14	77	304	697	835	1,843	998	304	2	1	5,075	51	1,001
Ottawa	....	1	18	365	556	747	419	112	35	1	2,254	21	102
Toronto	388	111	184	1,551	1,310	2,898	2,796	368	27	16	9,649	436	462
Windsor	1,181	487	357	2,661	5,065	6,593	7,623	765	28	....	24,760	....	393
Totals	1,837	1,815	1,910	6,584	8,855	13,604	13,436	1,859	116	18	50,034	520	2,097
Quebec.													
Montreal	.....	467	882	2,625	3,508	6,724	6,680	2,005	454	64	23,409	348	668
Quebec	....	257	196	1,071	1,679	1,593	1,325	519	166	2	6,808	56	152
St. Hyacinthe	.....	94	106	606	945	980	667	215	38	1	3,652	43	115
Three Rivers	....	101	49	249	498	481	355	155	34	...	1,922	5	70
Totals	.....	919	1,233	4,551	6,630	9,778	9,027	2,894	692	67	35,791	452	1,005
New Brunswick.													
St. John	.....	151	333	884	1,386	1,201	838	175	6	....	4,974	199	173
Nova Scotia.													
Cape Breton	.....	2	....	50	151	123	36	13	12	....	387	27	36
Halifax	.....	28	18	178	375	314	212	97	16	7	1,245	98	95
Pictou	.....	9	8	115	161	187	118	6	.....		604	38	39
Totals	.....	39	26	343	687	624	366	116	28	7	2,236	163	170
P. E. Island.													
Charlottetown	.....	.....	1	11	13	57	29	13	.....	.....	124	1	27
Manitoba.													
Winnipeg	16	3	2	381	708	701	507	181	1	....	2,500	93	110
N. W. Territories.													
Calgary	.....	4	1	93	165	141	105	5	.....	.....	514	10	27
British Columbia.													
Victoria	.....	..	1	16	30	82	21	1	...	....	151	....	86

SESSIONAL PAPER No. 13

D—*Continued.*

Machines of each Denomination, Inspected and Verified, in each Inspection Division, ended June 30, 1904.

BALANCES.

With Equal Arms.			Steel Yards with Divided Arms.				Weigh Bridges or Platform Scales.							
6 lbs. to 50 lbs.	51 lbs. to 100 lbs.	101 lbs. and upwards.	500 lbs. and under.	501 lbs. to 1,000 lbs.	1,001 lbs. to 2,000 lbs.	2,001 lbs. and upwards.	250 lbs. and under.	251 lbs. to 500 lbs.	501 lbs. to 2,000 lbs.	2,001 lbs. to 4,000 lbs.	4,001 lbs. to 6,000 lbs.	6,001 lbs. and upwards.	Total.	Miscellaneous.
253	....	....	72	6	2	....	639	169	805	165	60	195	2,505	109
1,232	....	....	2,201	40	2	1	2,965	98	2,089	229	68	236	10,162	1,226
203	....	....	8	....	....	....	625	155	1,331	40	54	71	2,589	5,770
596	3	....	311	10	2	4	1,650	179	1,619	241	75	361	4,913	812
632	....	....	243	1	....	....	1,451	118	3,840	260	64	350	7,352	94
2,916	3	....	2,835	57	6	5	6,730	719	9,684	935	321	1,213	27,521	8,011
1,424	5	8	868	10	3	12	2,168	913	1,897	161	151	239	8,527	397
961	3	94	156	2	....	....	764	642	406	18	10	64	3,272	64
417	....	....	108	2	....	....	715	447	633	34	94	97	2,662	58
269	....	....	37	....	....	....	321	373	272	14	13	16	1,385	4
3,071	8	102	1,169	14	3	12	3,968	2,375	3,208	227	268	416	15,846	523
587	1	....	69	1	....	1	517	239	298	26	22	52	1,936	216
71	....	5	9	3	....	....	162	37	43	3	6	45	420	....
236	2	3	51	1	1	....	437	109	137	16	6	73	1,167	171
60	....	....	7	....	1	....	106	53	50	4	13	29	362	13
367	2	8	67	4	2	....	705	199	230	23	25	147	1,949	184
65	....	....	9	....	....	....	91	50	130	9	8	14	403	17
317	....	....	80	3	2	....	718	34	687	264	626	430	3,271	246
35	....	....	11	....	1	....	98	8	167	17	21	51	436	72
53	....	....	41	6	7	....	283	14	221	22	7	47	787	95

APPENDIX

RETURN showing the Number of Dominion Measures of Capacity, Balances and during the Fiscal Year

Inspection Divisions.	Measures of Capacity. Dominion. Bushel.	½ Bushel.	Peck.	Gallon.	½ Gallon.	Quart.	Pint.	½ Pint.	Gill.	½ Gill.	Total Number.	Miscellaneous.	5 lbs. and under.
Ontario.													
Hamilton						2					2	4	11
Ottawa			4	16	45	16	3				84		18
Windsor													1
Totals			4	16	45	18	3				86	4	30
Quebec.													
Montreal				1	2	3	2	3	1		12		5
Quebec		1		2	4		1				8		4
St. Hyacinthe			1								1		1
Three Rivers													
Totals		1	1	3	6	3	3	3	1		21		10
New Brunswick.													
St. John													3
Nova Scotia.													
Cape Breton					2	1					3	1	
Halifax		2	1		1						4	10	
Pictou												1	
Totals		2	1		3	1					7	12	
Manitoba.													
Winnipeg													
N. W. Territories.													
Calgary													

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

SESSIONAL PAPER No. 13

D—*Concluded.*

Weighing Machines of each Denomination Rejected, in each Inspection Division, ended June 30, 1904.

Balances.													
With Equal Arms.			Steel Yards with Divided Arms.				Weigh Bridges or Platform Scales.						
6 lbs. to 50 lbs.	51 lbs. to 100 lbs.	101 lbs. and upwards.	500 lbs. and under.	501 lbs. to 1,000 lbs.	1,001 lbs. to 2,000 lbs.	2,001 lbs. and upwards.	250 lbs. and under.	251 lbs. to 500 lbs.	501 lbs. to 2,000 lbs.	2,001 lbs. to 4,000 lbs.	4,001 lbs. to 6,000 lbs.	6,001 lbs. and upwards.	Total.	Miscellaneous.
50			45				105	5	124	28	14	45	427	6
23			1	1			33	11	64	8	7	13	179	33
3			1				11	2	15	2		18	43	
76			47	1			149	18	203	38	21	76	659	39
31			29				17	27	47	4	7	8	175	11
40		4	6				16	25	30		1	3	129	1
18			6				26	19	26	2	14	6	118	
											1	1	2	
89		4	41				59	71	103	6	23	18	424	12
								1	1	1			6	
2							3	4	1			1	11	
8			2				10	1	12	3	1	15	52	2
								1	1	1	2	4	9	
10			2				13	6	14	4	3	20	72	2
			1				5	1	3	3	12	17	42	1
							1						1	

W. J. GERALD,
Deputy Minister.

APPENDIX E.

STATEMENT of Gas Expenditures and Receipts for the Year ended June 30, 1904.

Districts.	Inspectors.	Expenditures.						Receipts.
		Salaries.	Special Assistance.	Rent.	Travelling Expenses.	Sundries.	Totals.	
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Barrie	Shanacy, M.	100 00				0 80	100 80	65 50
Belleville	Johnson, Wm. Stuart, W. E.	449 96	110 94	157 50	51 25	82 11	854 76	145 50
Berlin	Broadfoot, S.	100 00			42 85	14 31	157 16	274 50
Brockville	Johnston, C. W. (acting)		99 96			13 45	113 41	369 75
Cobourg	Bickle, J. W.	100 00			30 60	30 46	161 06	130 00
Cornwall	Mulhern, M. M.	100 00				30 00	130 00	60 00
Guelph	Broadfoot, S.	200 00			6 00	14 25	220 25	250 50
Hamilton	McPhie, D. Dennis, W. A. McPhie, W. H.	2,499 96		18 00	123 80	75 21	2,716 97	3,128 25
Kingston	Behan, J. J. Gallaher, F.	38 70	15 00	22 50	25 55	65 70	167 45	196 00
Listowel	Male, Thos.	100 00		73 50		17 50	191 00	44 75
London	Nash, A. F.	1,100 00	24 00		258 90	94 65	1,477 55	2,733 25
Napanee	Johnson, Wm. (acting)				31 45	2 25	33 70	100 00
Ottawa	Roche, H. G.	1,100 00	540 00	300 00	16 40	66 95	2,023 35	670 50
Owen Sound	Graham, W. J.	200 00		125 00			325 00	132 50
Peterborough	Rork, Thos.	150 00			14 00	5 05	169 05	137 50
Sarnia	Hicks, W. H.	87 33		15 00	15 30	2 15	119 78	261 75
Stratford	Rennie, Geo. H.	200 00			4 95	14 60	219 55	177 75
Toronto	Johnstone, J. K. Pape, J. Whyte, J. A. Hunter, W. M.	3,438 25			5 75	51 00	3,495 00	6,991 00
	Ontario.	9,964 20	789 90	711 50	629 80	580 44	12,675 84	15,869 00
Montreal	Aubin, A. O'Flaherty, M. J.	2,399 88	368 00	240 00	20 75	134 00	3,162 63	8,013 25
Quebec	Levasseur, N. Moreau, A.	1,300 00		150 00		51 04	1,501 04	318 75
Sherbrooke	Simpson, A. F.	150 00					150 00	36 60
St. Hyacinthe	Benoit, L. V.	100 00					100 00	97 75
	Quebec.	3,949 88	368 00	390 00	20 75	185 04	4,913 67	8,465 75
Fredericton	Fowler, Jas. D.	200 00					200 00	51 50
St. John	Wilson, J. E.	1,100 00			86 90	6 20	1,193 16	505 50
	New Brunswick.	1,300 00			86 90	6 20	1,393 16	557 00
Halifax, N.S.	Miller, A. Munro, H. D. Ritchie, A. J.	1,999 92		307 35	371 18	122 72	2,801 17	496 50
Charlottetown, P.E.I	Bell, J. H.	357 49				52 43	409 92	130 50
Winnipeg, Man.	Magness, R.	300 00			119 25	26 00	445 25	870 25
Nanaimo	McAloney, J. A.	100 00					100 00	39 00
New Westminster	Wolfenden, Wm.	100 00					100 00	64 00
Vancouver	Miller, J. E.	300 00			82 00	64 90	446 90	220 00
Victoria	Jones, R.	200 00				1 40	201 40	248 00
	British Columbia.	700 00			82 00	66 30	848 30	571 00

APPENDIX E.—*Concluded.*

STATEMENT of Gas Expenditures and Receipts for the Year ended June 30, 1904.

RECAPITULATION.

Provinces.	Expenditures.						Receipts.
	Salaries.	Special Assistance.	Rent.	Travelling Expenses.	Sundries.	Totals.	
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Ontario	9,564 20	789 90	711 50	629 80	580 44	12,675 84	15,869 00
Quebec	3,949 88	368 00	390 00	20 75	185 04	4,913 67	8,465 75
New Brunswick	1,300 00			86 96	6 20	1,393 16	557 00
Nova Scotia	1,999 92		307 35	371 18	122 72	2,801 17	496 50
Prince Edward Island	357 49				52 43	409 92	130 50
Manitoba	300 00			119 25	26 00	445 25	870 25
British Columbia	700 00			82 00	66 30	848 30	571 00
General expenses					1,356 17	1,356 17	
Printing					378 43	378 43	
Stationery					157 24	157 24	
Totals	18,571 49	1,157 90	1,408 85	1,309 94	2,930 97	25,379 15	26,960 00

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

APPENDIX

Return of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power—Standard, 16 Candles.					Sulphur per 100 Allowance,		
	Highest.	Lowest.	Average.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Barrie—								
July			21·00	0	1			
August			22·60	0	1			
September			20·00	0	1			
October			19·90	0	1			
November			20·10	0	1			
December			19·80	0	1			
January			20·20	0	1			
February			15·10	1	1			
March			20·10	0	1			
April			19·20	0	1			
May			20·80	0	1			
June			21·40	0	1			
				1	12			
Belleville—								
July	21·31	20·81	21·06	0	2			
August	21·30	20·52	20·91	0	2			
September	22·09	21·07	21·58	0	2			
October	20·41	18·06	19·23	0	2			
November	20·73	16·01	18·37	0	2			
December	21·40	20·74	21·07	0	2			
January	21·93	20·65	21·11	0	2			
February	20.65	18·37	19·51	0	2			
March								
April			22·42	0	1			
May			22·00	0	1			
June	21·65	21·08	21·36	0	2			
				0	20			
Deseronto—								
July								
August								
September								
October			19·67	0	1			
November			19·87	0	1			
December			18·80	0	1			
January			20·70	0	1			
February			20·05	0	1			
March	20·70	18·94	19·59	0	2			
April			18·84	0	1			
May			22·00	0	1			
June			18·80	0	1			
				0	10			

SESSIONAL PAPER No. 13

F.

Inspected during the Year ended June 30, 1904.

Cubic Feet. 35 Grains.		Ammonia per 100 Cubic Feet—Allowance, 4 Grains.					Sulphuretted Hydrogen.			Remarks.
No. of times in excess of allowance.	No. of Tests.	Highest.	Lowest.	Average.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
		Grains.	Grains.	Grains.						
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							12	0	12	
							2	0	2	
							2	0	2	
							2	0	2	
							2	0	2	
							2	0	2	
							2	0	2	
							3	0	3	
							2	0	2	
										No test made, main frozen.
							1	0	1	
							1	0	1	
							2	0	2	
							21	0	21	
										Instruments out of order.
							1	0	1	
							1	0	1	
							0	1	1	
							1	0	1	
							1	0	1	
							2	1	3	
							0	1	1	
							0	1	1	
							1	0	1	
							7	4	11	

APPENDIX

Return of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power—Standard, 16 Candles.					Sulphur per 100 Allowance.		
	Highest.	Lowest.	Average.	No. of times below standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Berlin—								
July			19·11	0	1			
August			19·17	0	1			
September			19·62	0	1			
October			18·88	0	1			
November			19·63	0	1			
December			17·11	0	1			
January			16·31	0	1			
February			17·06	0	1			
March			16·52	0	1			
April			18·99	0	1			
May			20·80	0	1			
June			19·19	0	1			
				0	12			
Brockville—								
July			20·43	0	1			
August			21·24	0	1			
September			20·18	0	1			
October			19·64	0	1			
November			19·86	0	1			
December			18·02	0	1			
January			19·39	0	1			
February			20·26	0	1			
March			18·96	0	1			
April			20·44	0	1			
May			22·00	0	1			
June			20·70	0	1			
				0	12			
Cobourg—								
July			21·10	0	1			
August			17·42	0	1			
September			18·10	0	1			
October			18·24	0	1			
November			17·63	0	1			
December			17·71	0	1			
January								
February			18·06	0	1			
March			17·14	0	1			
April			16·77	0	1			
May			17·15	0	1			
June			17·66	0	1			
				0	11			

SESSIONAL PAPER No. 13

F.—*Continued.*

Inspected during the Year ended June 30, 1904.

Cubic Feet. 35 Grains.		Ammonia per 100 Cubic Feet 4 Grains.			Allowance.		Sulphuretted Hydrogen.			Remarks.
No. of times in excess of allowance.	No. of Tests.	Highest.	Lowest.	Average.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
		Grains.	Grains.	Grains.						
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							12	0	12	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							12	0	12	
							1	1	2	
							1	1	2	
							1	1	2	
							1	1	2	
							1	1	2	
							1	1	2	
							1	1	2	
							2	0	2	No illuminating power test, Photometer undergoing repairs.
							2	0	2	
							1	1	2	
								2	2	
							1	1	2	
							13	11	24	

APPENDIX

Return of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power—Standard, 16 Candles.					Sulphur per 100 Allowance,		
	Highest.	Lowest.	Average.	No. of times below standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Port Hope—								
July			19·20	0	1			
August			19·84	0	1			
September			20·18	0	1			
October			19·23	0	1			
November			17·55	0	1			
December			21·92	0	1			
January			19·19	0	1			
February			19·37	0	1			
March			19·85	0	1			
April			17·79	0	1			
May			18·08	0	1			
June			18·20	0	1			
				0	12			
Cornwall—								
July			18·40	0	1			
August			18·10	0	1			
September			18·10	0	1			
October			18·40	0	1			
November			18·60	0	1			
December			18·10	0	1			
January			17·90	0	1			
February			18·10	0	1			
March			17·90	0	1			
April			17·90	0	1			
May			17·90	0	1			
June			18·05	0	1			
				0	12			
Guelph—								
July			18·89	0	1			
August			19·81	0	1			
September			19·56	0	1			
October			17·81	0	1			
November			18·17	0	1			
December			18·68	0	1			
January			17·34	0	1			
February			19·30	0	1			
March			20·16	0	1			
April			20·00	0	1			
May			19·94	0	1			
June			20·84	0	1			
				0	12			

SESSIONAL PAPER No. 13

F.—*Continued.*

Inspected during the Year ended June 30, 1904.

Cubic Feet, 35 Grains.		Ammonia per 100 Cubic Feet—Allowance, 4 Grains.					Sulphuretted Hydrogen.			Remarks.
No. of times in excess of allowance.	No. of Tests.	Highest.	Lowest.	Average.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
		Grains.	Grains.	Grains.						
							12	0	12	
							12	0	12	
							12	0	12	
							12	0	12	
							12	0	12	
							12	0	12	
							12	0	12	
							12	0	12	
							12	0	12	
							12	0	12	
							24	0	24	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							12	0	12	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							12	0	12	

APPENDIX

Return of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power—Standard, 16 Candles.					Sulphur per 100 Allowance,		
	Highest.	Lowest.	Average.	No. of times below standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Hamilton—								
July	18·56	18·17	18·36	0	2			
August	18·25	18·08	18·16	0	2			
September	18·04	18·02	18·03	0	2			
October	18·24	17·85	18·04	0	2			
November	18·50	17·79	18·14	0	2			
December	18·60	17·46	18·03	0	2			
January	18·29	18·24	18·26	0	2			
February	17·84	16·78	17·31	0	2			
March	17·14	17·07	17·10	0	2			
April	18·02	17·89	17·95	0	2			
May	18·15	17·25	17·70	0	2			
June	18·89	17·82	18·55	0	2			
				0	24			
Brantford—								
July			19·73	0	1			
August			18·90	0	1			
September			19·01	0	1			
October			19·82	0	1			
November			18·71	0	1			
December			19·87	0	1			
January			18·88	0	1			
February			18·99	0	1			
March			18·71	0	1			
April			20·70	0	1			
May			16·73	0	1			
June			19·52	0	1			
				0	12			
Dundas—								
July			19·34	0	1			
August			19·03	0	1			
September			18·35	0	1			
October			18·20	0	1			
November			19·66	0	1			
December			19·19	0	1			
January			18·56	0	1			
February			16·88	0	1			
March			16·29	0	1			
April			18·04	0	1			
May			18·12	0	1			
June			19·34	0	1			
				0	12			

SESSIONAL PAPER No. 13

F.—*Continued.*

Inspected during the Year ended June 30, 1904.

Cubic Feet, 35 Grains.		Ammonia per 100 Cubic Feet. Allowance, 4 Grains.					Sulphuretted Hydrogen.			Remarks.
No. of times in excess of allowance.	No. of Tests.	Highest.	Lowest.	Average.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
		Grains.	Grains.	Grains.						
							12	0	12	
							12	0	12	
							12	0	12	
							12	0	12	
							12	0	12	
							12	0	12	
							12	0	12	
							12	0	12	
							12	0	12	
							12	0	12	
							12	0	12	
							12	0	12	
							24	0	24	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							12	0	12	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							12	0	12	

APPENDIX

Return of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power—Standard, 16 Candles.					Sulphur per 100 Allowance,		
	Highest.	Lowest.	Average.	No. of times below standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Galt—								
July			19·66	0	1			
August			19·02	0	1			
September			18·80	0	1			
October			20·10	0	1			
November			18·02	0	1			
December			17·83	0	1			
January			18·82	0	1			
February			18·02	0	1			
March			20·62	0	1			
April			20·07	0	1			
May			19·62	0	1			
June			18·02	0	1			
				0	12			
St. Catharines—								
July			20·19	0	1			
August			20·12	0	1			
September			19·50	0	1			
October			19·12	0	1			
November			18·50	0	1			
December			18·78	0	1			
January			18·92	0	1			
February			18·59	0	1			
March			17·99	0	1			
April			19·34	0	1			
May			19·28	0	1			
June			17·07	0	1			
				0	12			
Kingston								
July			22·10	0	1			
August								
September								
October								
November								
December			20·37	0	1			
January			18·90	0	1			
February			19·08	0	1			
March								
April			19·31	0	1			
May	21·14	19·09	20·11	0	2			
June	21·54	19·26	20·75	0	2			
				0	9			

SESSIONAL PAPER No. 13

F.—*Continued.*

Inspected during the Year ended June 30, 1904.

Cubic Feet—35 Grains.		Ammonia per 100 Cubic Feet Allowance, 4 Grains.			Sulphuretted Hydrogen.				
No. of times in excess of allowance.	No. of Tests.	Highest.	Lowest.	Average.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	Remarks.
		Grains.	Grains.	Grains.						
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							12	0	12	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							12	0	12	
							1	0	1	
										No officer in charge.
							0	2	2	
							0	0	0	
							1	0	1	
							0	1	1	
							2	0	2	
							2	0	2	
							6	3	9	

APPENDIX

Return of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power—Standard, 16 Candles.					Sulphur per 100 Allowance,		
	Highest.	Lowest.	Average.	No. of times below standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Listowel—								
July					Nil.			
August			17·44	0	1			
September			20·04	0	1			
October			22·55	0	1			
November			22·55	0	1			
December			20·26	0	1			
January			19·57	0	1			
February			17·26	0	1			
March			20·15	0	1			
April			17·00	0	1			
May			18·49	0	1			
June			19·27	0	1			
				0	11			
London—								
July	17·62	17·48	17·55	0	2			
August	18·83	16·07	17·45	0	2			
September	18·75	16·97	17·86	0	3			
October	20·91	20·72	20·81	0	2			
November	21·46	20·59	21·02	0	2			
December	20·41	19·93	20·17	0	2			
January	20·41	20·28	20·34	0	2			
February	21·05	19·30	20·17	0	2			
March	21·02	18·11	19·56	0	2			
April	18·25	17·18	17·71	0	2			
May	21·13	20·63	20·88	0	2			
June	22·53	20·26	21·39	0	2			
				0	25			
Chatham—								
July			16·60	0	1			
August			18·26	0	1			
September			16·00	0	1			
October			16·83	0	2			
November			16·02	0	2			
December			16·21	0	1			
January			16·62	0	1			
February			16·21	0	1			
March			16·21	0	1			
April			16·58	0	1			
May			17·45	0	1			
June			16·50	0	1			
				0	14			

SESSIONAL PAPER No. 13

F—*Continued.*

Inspected during the Year ended June 30, 1904.

Cubic Feet 35 Grains.		Ammonia per 100 Cubic Feet—Allowance, 4 Grains.					Sulphuretted Hydrogen.			Remarks.
No. of times in excess of allowance.	No. of Tests.	Highest.	Lowest.	Average.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
		Grains.	Grains.	Grains.						
									Nil.	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							11	0	11	
							12	0	12	
							12	0	12	
							12	0	12	
							12	0	12	
							12	0	12	
							12	0	12	
							12	0	12	
							12	0	12	
							12	0	12	
							12	0	12	
							12	0	12	
							12	0	12	
							25	0	25	
							1	0	1	
							1	0	1	
							1	0	1	
							12	0	12	
							1	0	1	
							1	0	1	
							1	0	1	
							0	1	1	
							1	0	1	
							1	0	1	
							1	0	1	
							13	1	14	

APPENDIX

Return of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power—Standard 16 Candles.					Sulphur per 100 Allowance,		
	Highest.	Lowest.	Average.	No. of times below standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Ingersoll—								
July			17·15	0	1			
August			12·85	1	1			
September			18·45	0	1			
October			18·50	0	1			
November			16·82	0	1			
December			22·43	0	1			
January			14·73	1	1			
February			19·95	0	1			
March			16·03	0	1			
April			17·41	0	1			
May			16·66	0	1			
June			14·77	1	1			
				3	12			
St. Thomas—								
July			20·09	0	1			
August			19·25	0	1			
September			16·79	0	1			
October			17·25	0	1			
November			17·70	0	1			
December			16·25	0	1			
January			17·17	0	1			
February			24·04	0	1			
March			16·96	0	1			
April			16·12	0	1			
May			16·00	0	1			
June			16·88	0	1			
				0	12			
Windsor—								
July			17·77	0	1			
August			19·42	0	1			
September			17·47	0	1			
October	17·26	17·20	17·23	0	2			
November			15·78	1	1			
December			16·95	0	1			
January			17·65	0	1			
February			14·65	1	1			
March	18·50	16·98	17·74	0	2			
April	21·12	15·96	18·54	1	2			
May			18·98	0	1			
June	18·82	18·17	18·49	0	2			
				3	16			

SESSIONAL PAPER No. 13

F—*Continued.*

Inspected during the Year ended June 30, 1904.

Cubic Feet—35 Grains.		Ammonia per 100 Cubic Feet—Allowance 4 Grains.					Sulphuretted Hydrogen.			Remarks.
No. of times in excess of allowance.	No. of Tests.	Highest.	Lowest.	Average.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
		Grains.	Grains.	Grains.						
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							0	1	1	
							1	0	1	
							1	0	1	
							11	1	12	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							12	0	12	
							1	0	1	
							1	0	1	
							1	0	1	
							2	0	2	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							2	0	2	
							2	0	2	
							1	0	1	
							2	0	2	
							16	0	16	

APPENDIX

Return of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power—Standard, 16 Candles.					Sulphur per 100 Allowance		
	Highest.	Lowest.	Average.	No. of times below standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Woodstock—								
July			18·40	0	1			
August			18·38	0	1			
September			18·33	0	1			
October			16·09	0	1			
November			15·37	1	1			
December			16·22	0	1			
January			14·55	1	1			
February			17·95	0	1			
March			16·82	0	1			
April			15·84	1	1			
May			17·39	0	1			
June			16·79	0	1			
				3	12			
Napanee—								
July								
August			18·08	0	1			
September			14·51	1	1			
October			18·37	0	1			
November			20·34	0	1			
December			19·39	0	1			
January			17·40	0	1			
February			20·91	0	1			
March	29·91	17·56	18·88	0	2			
April			20·72	0	1			
May			18·52	0	1			
June			21·40	0	1			
				1	12			
Ottawa—								
July	21·87	21·66	21·76	0	2	14·99	13·82	14·40
August	21·69	21·21	21·45	0	2	14·40	14·19	14·29
September	21·38	21·05	21·21	0	2	14·39	14·19	14·29
October	21·85	21·10	21·47	0	2	14·60	14·30	14·45
November	21·36	21·30	21·33	0	2	14·52	14·20	14·36
December	21·30	21·10	21·20	0	2	14·58	14·30	14·42
January	21·61	21·22	21·41	0	2	14·81	14·32	14·56
February	19·90	18·41	19·15	0	2	15·03	14·59	14·81
March	18·99	18·05	18·52	0	2	14·75	14·44	14·59
April	19·03	17·05	18·54	0	2	14·59	13·82	14·20
May	18·10	17·90	18·00	0	2	14·92	14·29	14·60
June	17·73	17·54	17·63	0	2	14·70	14·36	14·53
				0	24			

SESSIONAL PAPER No. 13

F—*Continued.*

Inspected during the Year ended June 30, 1904.

Cubic Feet—35 Grains.		Ammonia per 100 Cubic Feet—Allowance, 4 Grains.					Sulphuretted Hydrogen.			Remarks.
No. of times in excess of allowance.	No. of Tests.	Highest.	Lowest.	Average.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
		Grains.	Grains.	Grains.						
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							0	1	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							11	1	12	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							0	1	1	
							0	1	1	
							0	1	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							8	3	11	
0	12				0	12	12	0	12	
0	12				0	12	12	0	12	
0	12				0	12	12	0	12	
0	12				0	12	12	0	12	
0	12				0	12	12	0	12	
0	12				0	12	11	1	12	
0	12				0	12	11	1	12	
0	12				0	12	11	1	12	
0	12				0	12	11	1	12	
0	12				0	12	11	1	12	
0	12				0	12	11	1	12	
0	24				0	24	17	0	17	

APPENDIX

Return of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power—Standard, 16 Candles.					Sulphur per 100 Allowance.		
	Highest.	Lowest.	Average.	No. of times below standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.			Grains.	Grains.	Grains
Owen Sound—								
July			22·00	0	1			
August			22·90	0	1			
September			22·02	0	1			
October			23·10	0	1			
November			21·97	0	1			
December			21·86	0	1			
January			22·30	0	1			
February			22·09	0	1			
March			21·07	0	1			
April			21 06	0	1			
May			22·00	0	1			
June			22 15	0	1			
				0	12			
Peterborough—								
July	22·50	18·00	20·25	0	2			
August	19·25	18 80	19 02	0	2			
September	20·40	20·00	20·20	0	2			
October	19·00	18·50	18·75	0	2			
November	20 90	20·00	20·45	0	2			
December	18·25	15·00	16·63	1	2			
January	19·20	17·10	18 15	0	2			
February	18·40	17·30	17·85	0	2			
March	19·20	9·25	14·15	2	3			
April	19·00	17·10	18·05	0	2			
May	17·40	17·20	17·30	0	2			
June	19·30	19·00	19·15	0	2			
				3	25			
Sarnia—								
July								
August			21·00	0	1			
September			20·00	0	1			
October			21·00	0	1			
November			21·50	0	1			
December			21·10	0	1			
January			21·00	0	1			
February			18·80	0	1			
March			19·50	0	1			
April								
May			20·32	0	1			
June			19·50	0	1			
				0	10			

SESSIONAL PAPER No. 13

F—*Continued.*

Inspected during the Year ended June 30, 1904.

Cubic Feet—35 Grains.		Ammonia per 100 Cubic Feet—4 Grains.					Sulphuretted Hydrogen.			Remarks.
No. of times in excess of allowance.	No. of Tests.	Highest.	Lowest.	Average.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
		Grains.	Grains.	Grains.						
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							12	0	12	
							2	1	3	
							1	1	2	
							2	0	2	
							2	0	2	
							1	1	2	
							2	0	2	
							2	0	2	
							3	0	3	
							2	0	2	
							2	0	2	
							23	3	26	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							10	0	10	

APPENDIX

Return of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power—Standard, 16 Candles.					Sulphur per 100 Allowance		
	Highest.	Lowest.	Average.	No. of times below standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Stratford—								
July			17·17	0	1			
August			17·24	0	1			
September			17·17	0	1			
October			16·67	0	1			
November			15·05	1	1			
December								
January			16·17	0	1			
February			16·74	0	1			
March			16·04	0	1			
April			16·65	0	1			
May			16·41	0	1			
June			16·97	0	1			
				1	11			
Toronto—								
July	20·31	19·41	19·90	0	8	17·08	16·27	16·67
August	20·31	19·26	19·34	0	9	17·02	15·67	16·34
September	19·26	17·77	18·66	0	9	15·47	14·60	15·03
October	19·65	17·56	18·65	0	9	19·51	16·81	18·16
November	18·52	16·60	17·52	0	8	15·50	11·62	13·56
December	19·44	18·11	18·76	0	9	18·15	17·98	18·06
January	18·91	17·29	18·20	0	9	17·12	15·67	16·39
February	18·60	17·96	18·27	0	8	19·63	16·99	18·31
March	19·70	17·98	18·85	0	9	20·19	16·75	18·47
April	16·97	18·74	19·37	0	9	18·15	16·61	17·38
May	19·91	18·36	19·50	0	8	20·88	15·06	17·97
June	20·07	18·51	19·33	0	9	22·43	16·68	19·55
				0	104			
Montreal—								
July	20·22	17·64	19·22	0	8	24·68	17·79	21·23
August	20·99	16·25	18·13	0	9	25·38	15·34	20·36
September	20·01	17·59	18·60	0	9	24·48	20·88	22·68
October	20·78	17·40	18·88	0	9	32·96	30·11	31·50
November	18·17	16·81	17·52	0	8	28·43	22·27	25·35
December	17·39	16·13	16·71	0	9	20·72	20·03	20·37
January	17·89	16·06	17·12	0	9	30·87	22·42	26·64
February	18·07	16·07	16·70	0	8	31·28	23·56	27·42
March	18·04	16·01	16·59	0	9	24·77	12·07	18·42
April	17·99	16·03	16·71	0	9	28·09	27·15	27·62
May	17·92	16·61	17·09	0	9	31·92	31·53	31·71
June	19·67	17·57	18·28	0	8	33·17	32·08	32·62
				0	104			

SESSIONAL PAPER No. 13

F—*Continued.*

Inspected during the Year ended June 30, 1904.

Cubic Feet—35 Grains.		Ammonia per 100 Cubic Feet 4 Grains.			Allowance.		Sulphuretted Hydrogen.			Remarks.
No. of times in excess of allowance.	No. of Tests.	Highest.	Lowest.	Average.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
		Grains.	Grains.	Grains.						
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	No test for illuminating power due to leak in photometer.
							0	0	0	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							11	0	11	
0	2	1·23	0·98	1·10	0	2	8	0	8	
0	2	0·87	0·77	0·82	0	2	9	0	9	
0	2	0·76	0·69	0·72	0	2	9	0	9	
0	2	1·26	0·86	1·06	0	2	9	0	9	
0	2	0·61	0·40	0·50	0	2	8	0	8	
0	2	1·06	0·66	0·86	0	2	9	0	9	
0	2	0·88	0·26	0·57	0	2	9	0	9	
0	2	1·27	1·18	1·22	0	2	8	0	8	
0	2	1·32	0·76	1·04	0	2	9	0	9	
0	2	0·65	0·40	0·52	0	2	9	0	9	
0	2	1·36	0·24	0·80	0	2	8	0	8	
0	2	1·22	0·31	0·76	0	2	9	0	9	
0	24				0	24	104	0	104	
0	2	0·00	0·00	0·00	0	2	12	0	12	
0	2	0·25	0·00	0·12	0	2	14	0	14	
0	2	0·50	0·00	0·25	0	2	14	0	14	
0	2	0·00	0·00	0·00	0	2	14	0	14	
0	2	0·00	0·00	0·00	0	2	12	0	12	
0	2	3·11	0·00	1·55	0	2	9	0	9	
0	2	0·00	0·00	0·00	0	2	13	0	13	
0	2	0·00	0·00	3·00	0	2	12	0	12	
0	2	0·00	0·00	0·00	0	2	14	0	14	
0	2	0·00	0·00	0·00	0	2	13	0	13	
0	2	0·00	0·00	0·00	0	2	13	0	13	
0	2	0·00	0·00	0·60	0	2	12	0	12	
0	24				0	24	152	0	152	

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

INSPECTION OFFICES.	ILLUMINATING POWER—STANDARD, 16 CANDLES.					SULPHUR PER 100 ALLOWANCE		
	Highest.	Lowest.	Average.	No. of times below standard.	No. of Tests.	Highest	Lowest.	Average.
	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Quebec—								
July			17·90	0	1	21·77	16·02	18·89
August			17·64	0	1	16·75	13·93	15·34
September			17·77	0	1	19·55	18·59	19·07
October			18·01	0	1	18·78	14·43	16·60
November			18·04	0	1	18·54	16·88	17·71
December			16·23	0	1	13·94	13·85	13·65
January			17·76	0	1	18·41	17·60	18·00
February			17·05	0	1	15·07	12·85	13·96
March			16·96	0	1	16·65	11·77	14·21
April			17·90	0	1	21·18	17·25	19·21
May			18·07	0	1	22·55	17·79	20·17
June			17·94	0	1	19·93	13·99	16·96
				0	12			
Sherbrooke—								
July			18·93	0	1			
August			18·98	0	1			
September			19·42	0	1			
October			19·11	0	1			
November			17·04	0	1			
December			17·26	0	1			
January			18·22	0	1			
February			16·51	0	1			
March			16·69	0	1			
April			17·55	0	1			
May			17·24	0	1			
June			17·80	0	1			
				0	12			
St. Hyacinthe—								
July			18·59	0	1			
August			18·49	0	1			
September			18·75	0	1			
October			18·68	0	1			
November			18·47	0	1			
December			18·35	0	1			
January			18·42	0	1			
February			18·63	0	1			
March			18·96	0	1			
April			18·59	0	1			
May			18·32	0	1			
June			18·47	0	1			
				0	12			

F--*Continued.*

Inspected during the Year ended June 30, 1904.

Cubic Feet—35 Grains.		Ammonia per 100 Cubic Feet—Allowance, 4 Grains.					Sulphuretted Hydrogen.			Remarks.
No. of times in excess of allowance.	No. of Tests.	Highest.	Lowest.	Average.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
		Grains.	Grains.	Grains.						
0	2	...	...	...	0	2	2	0	2	
0	2	...	...	...	0	2	2	0	2	
0	2	...	...	...	0	2	2	0	2	
0	2	...	...	...	0	2	2	0	2	
0	2	...	...	...	0	2	2	0	2	
0	2	...	...	...	0	2	2	0	2	
0	2	...	...	...	0	2	2	0	2	
0	2	...	...	...	0	2	2	0	2	
0	2	...	...	...	0	2	2	0	2	
0	2	...	...	...	0	2	2	0	2	
0	2	...	...	...	0	2	2	0	2	
0	2	...	...	...	0	2	2	0	2	
0	24				0	24	24	0	24	
...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	1	0	1	
							12	0	12	
...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	0	0	0	
...	...	...	...	...	...	...	0	0	0	
...	...	...	...	...	...	...	0	0	0	
...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	1	0	1	
							9	0	9	

APPENDIX

Return of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power - Standard, 16 Candles					Sulphur per 100 Allowance,		
	Highest.	Lowest.	Average.	No. of times below standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Fredericton —								
July	18·31	17·28	17·81	0	5			
August	17·91	17·37	17·66	0	4			
September	17·45	17·06	17·21	0	4			
October	17·82	15·63	16·94	1	5			
November	17·47	16·82	17·21	0	5			
December	17·86	16·69	17·36	0	5			
January	17·42	16·90	17·19	0	6			
February	18·77	16·36	17·42	0	5			
March	17·88	17·21	17·51	0	5			
April	17·90	16·69	17·35	0	5			
May	18·31	17·38	17·82	0	5			
June	18·31	17·84	18·13	0	5			
				1	59			
St. John								
July	17·31	16·66	17·03	0	5	28·00	26·00	27·02
August	17·10	16·84	16·91	0	5	25·49	25·13	25·31
September	16·73	16·19	16·50	0	5	23·34	21·09	22·21
October	18·04	16·20	17·15	0	6	26·43	24·87	25·65
November	17·17	16·58	17·75	0	5	26·00	20·42	23·21
December	18·13	16·86	17·74	0	5	23·34	17·19	20·26
January	17·89	16·28	17·11	0	4	26·88	22·76	24·82
February	17·71	16·82	17·19	0	5	30·97	27·08	29·04
March	17·64	16·13	17·01	0	5	28·58	26·62	27·60
April	17·49	16·13	16·95	0	5	28·98	23·24	26·11
May	17·20	16·59	16·92	0	4	25·23	19·51	22·37
June	18·10	17·06	17·61	0	4	23·36	20·67	22·01
				0	58			
Moncton —								
July			17·59	0	1			
August			18·90	0	1			
September			17·97	0	1			
October			17·56	0	1			
November			20·28	0	1			
December			18·62	0	1			
January			19·24	0	1			
February			18·80	0	1			
March			18·93	0	1			
April			17·60	0	1			
May			19·02	0	1			
June			19·12	0	1			
				0	12			

SESSIONAL PAPER No. 13

F—*Continued.*

Inspected during the Year ended June 30, 1904.

Cubic Feet—35 Grains.		Ammonia per 100 Cubic Feet 4 Grains.			Allowance		Sulphuretted Hydrogen.			Remarks.
No. of times in excess of allowance.	No. of Tests.	Highest.	Lowest.	Average.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
		Grains.	Grains.	Grains.						
							5	0	5	
							4	0	4	
							4	0	4	
							3	2	5	
							5	0	5	
							5	0	5	
							6	0	6	
							4	1	5	
							5	0	5	
							5	0	5	
							5	0	5	
							56	3	59	
0	2	0·87	0·50	0·68	0	2	5	0	5	
0	2	1·27	1·02	1·04	0	2	5	0	5	
0	2	1·31	1·11	1·20	0	2	5	0	5	
0	2	3·33	1·28	2·30	0	2	6	0	6	
0	2	1·75	1·02	1·38	0	2	5	0	5	
0	2	1·26	0·00	0·63	0	2	5	0	5	
0	2	1·09	0·00	0·54	0	2	4	0	4	
0	2	1·23	0·98	1·01	0	2	5	0	5	
0	2	1·53	1·16	1·34	0	2	5	0	5	
0	2	0·00	0·00	0·00	0	2	5	0	5	
0	2	1·06	0·00	0·53	0	2	4	0	4	
0	2	1·42	1·21	1·31	0	2	4	0	4	
0	24				0	24	58	0	58	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							12	0	12	

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

INSPECTION OFFICES.	ILLUMINATING POWER—STANDARD, 16 CANDLES.					SULPHUR PER 100 ALLOWANCE		
	Highest.	Lowest.	Average.	No. of times below standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Halifax—								
July			17·59	0	1			13·73
August			17·71	0	1			17·02
September			17·26	0	1			15·64
October			18·19	0	1			15·20
November			17·03	0	1			11·46
December			18·41	0	1			12·63
January			18·15	0	1			13·15
February			18·24	0	1			13·05
March			17·83	0	1			11·53
April			17·96	0	1			11·42
May			17·50	0	1			9·68
June			17·94	0	1			11·22
				0	12			
Pictou—								
July			18·81	0	1			
August			18·10	0	1			
September			18·62	0	1			
October			18·68	0	1			
November			16·64	0	1			
December			17·10	0	1			
January			17·28	0	1			
February			18·10	0	1			
March			18·15	0	1			
April			19·25	0	1			
May			19·34	0	1			
June			18·83	0	1			
				0	12			
Yarmouth—								
July			17·40	0	1			
August			17·41	0	1			
September			17·41	0	1			
October			18·57	0	1			
November			17·93	0	1			
December			17·48	0	1			
January			17·70	0	1			
February			16·39	0	1			
March			18·10	0	1			
April			17·55	0	1			
May			17·60	0	1			
June			17·64	0	1			
				0	12			

F—*Continued.*

Inspected during the Year ended June 30, 1904.

Cubic Feet—35 Grains.		Ammonia per 100 Cubic Feet—Allowance 4 Grains.					Sulphuretted Hydrogen.			Remarks.
No. of times in excess of allowance.	No. of Tests.	Highest.	Lowest.	Average.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
		Grains.	Grains.	Grains.						
0	1	....	....	....	0	1	1	0	1	
0	1	....	....	....	0	1	1	0	1	
0	1	....	....	....	0	1	1	0	1	
0	1	....	....	....	0	1	1	0	1	
0	1	....	....	....	0	1	1	0	1	
0	1	....	....	....	0	1	1	0	1	
0	1	....	....	....	0	1	1	0	1	
0	1	....	....	....	0	1	1	0	1	
0	1	....	....	....	0	1	1	0	1	
0	1	....	....	....	0	1	1	0	1	
0	1	....	....	....	0	1	1	0	1	
0	1	....	....	....	0	1	1	0	1	
0	12				0	12	12	0	12	
....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	1	0	1	
							12	0	12	
....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	1	0	1	
....	....	....	....	....	....	....	1	0	1	
							12	0	12	

APPENDIX

Return of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power—Standard, 16 Candles.					Sulphur per 100 Allowance.		
	Highest.	Lowest.	Average.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Charlottetown—								
July	17·38	16·00	16·69	0	2			
August			18·18	0	1			
September			18·69	0	1			
October			18·17	0	1			
November			18·29	0	1			
December			18·24	0	1			
January	22·00	21·32	21·66	0	2			
February	23·37	16·83	20·10	6	2			
March			15·82	0	1			
April			21·26	0	1			
May	19·25	17·44	18·34	0	2			
June	18·90	17·37	18·13	0	2			
				0	17			
Winnipeg—								
July			17·19	0	1			
August			18·57	0	1			
September			20·26	0	1			
October			18·57	0	1			
November			18·72	0	1			
December			16·91	0	1			
January			18·66	0	1			
February			20·63	0	1			
March			20·00	0	1			
April			21·18	0	1			
May			19·00	0	1			
June			19·73	0	1			
				0	12			
Nanaimo—								
July			18·37	0	1			
August			18·63	0	1			
September			17·69	0	1			
October			18·61	0	1			
November			19·80	0	1			
December			18·26	0	1			
January			18·24	0	1			
February			18·29	0	1			
March			18·06	0	1			
April			19·60	0	1			
May			18·28	0	1			
June			18·07	0	1			
				0	12			

SESSIONAL PAPER No. 13

F—*Continued.*

Inspected during the Year ended June 30, 1904.

Cubic Feet—35 Grains.		Ammonia per 100 Cubic Feet—Allowance, 4 Grains.					Sulphuretted Hydrogen.			Remarks.
No. of times in excess of allowance.	No. of Tests.	Highest.	Lowest.	Average.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
		Grains.	Grains.	Grains.						
							12	0	12	
							12	0	12	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							12	0	12	
							1	0	1	
							1	0	1	
							12	0	12	
							18	0	18	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							12	0	12	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							12	0	12	

APPENDIX

Return of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power—Standard, 16 Candles.					Sulphur per 100 Allowance,		
	Highest.	Lowest.	Average.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
New Westminster—								
July			19·23	0	1			
August			19·03	0	1			
September			18·95	0	1			
October			18·84	0	1			
November			18·78	0	1			
December			19·19	0	1			
January			19·22	0	1			
February			19·59	0	1			
March			18·64	0	1			
April			19·00	0	1			
May			19·38	0	1			
June			16·93	0	1			
				0	12			
Vancouver—								
July			18·24	0	1			
August			18·36	0	1			
September			18·28	0	1			
October			17·80	0	1			
November			18·10	0	1			
December			18·42	0	1			
January			17·89	0	1			
February			17·75	0	1			
March			17·01	0	1			
April			17·30	0	1			
May			17·35	0	1			
June			17·70	0	1			
				0	12			
Victoria—								
July			18·00	0	1			
August			17·74	0	1			
September			17·38	0	1			
October								
November			17·94	0	1			
December			18·02	0	1			
January			18·07	0	1			
February			18·10	0	1			
March			18·17	0	1			
April			18·24	0	1			
May			18·12	0	1			
June			18·00	0	1			
				0	11			

Inland Revenue Department,
Ottawa, August 19, 1904.

—Continued.

nspected during the Year ended June 30, 1904.

Cubic Feet—5 Grains.		Ammonia per 100 Cubic Feet—Allowance, 4 Grains.					Sulphuretted Hydrogen.			Remarks.
No. of times in excess of allowance.	No. of Tests.	Highest.	Lowest.	Average.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
		Grains.	Grains.	Grains.						
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							12	0	12	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							12	0	12	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							1	0	1	
							11	0	10	

W. J. GERALD,
Deputy Minister.

APPENDIX G.

STATEMENT of Gas Meters presented for Verification, Verified and Rejected during the Year ended June 30, 1904.

INSPECTION OFFICES.	Presented for Verification.	Kind.		Verified as coming within the Error tolerated by Law.			Rejected.			Totals, Verified and Rejected.	
		Wet.	Dry.	Correct.	Fast.	Slow.	Unsound.	Fast.	Slow.	Verified.	Rejected.
Barrie	30	....	30	...	14	16	....	..	.....	30	....
Belleville	71	....	71	12	14	45	.....	....	.....	71	.
Berlin	197	.....	197	2	91	93	...	11	.....	186	11
Brockville	346	.....	346	86	102	158	..	.....	...	346	....
Cobourg	57	.. .	57	4	36	15	.....	1	1	55	2
Cornwall	23	.....	23	7	5	11	.....	.....	.....	23	.....
Guelph	227	.....	227	2	58	167	..	.....	..	227	....
Hamilton	2,400	...	2,400	482	324	1,128	90	73	303	1,934	466
Kingston	120	....	120	10	36	69	.....	1	4	115	5
Listowel	10	.....	10	3	2	3	....	2	.....	8	2
London	2,421	.....	2,421	553	521	1,309	3	27	8	2,383	38
Napanee	68	..	68	18	23	18	1	7	1	59	9
Ottawa	410	1	409	30	34	342	....	4	....	406	4
Owen Sound	100	.....	100	99	.....	1	....	.....	.....	100	....
Peterborough	101	.....	101	43	7	51	.....	.....	.....	101	....
Sarnia	227	....	227	107	10	103	....	2	5	220	7
Stratford	163	.. .	163	44	60	53	4	1	1	157	6
Toronto	6,666	.....	6,666	1,120	1,953	3,563	14	14	2	6,636	30
Montreal	8,686	.....	8,686	1,462	4,134	2,965	21	99	5	8,561	125
Quebec	129	.....	129	30	28	69	.....	1	1	127	2
Sherbrooke	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Hyacinthe	74	.....	74	49	9	16	..	..	.....	74	.....
Fredericton	9	.. .	9	....	....	9	...	.....	....	9	...
St. John	320	....	320	123	21	171	. .	1	4	315	5
Halifax	241	.....	241	216	12	13	.....	...	.....	241	.....
Charlottetown	90	..	90	11	21	30	19	4	5	62	28
Winnipeg	738	.....	738	323	21	394	.....	.....	.....	738	.....
Nanaimo	2	.....	2	2	.....	.....	.....	.....	.....	2	.....
New Westminster	19	....	19	... ..	7	12	...	.....	.	19	... ..
Vancouver	193	..	193	52	50	91	...	...	...	193	.....
Victoria	151	.....	151	34	48	69	.....	.....	.....	151	...
Totals	24,289	1	24,288	4,924	7,641	10,984	152	248	340	23,549	740

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

APPENDIX H

STATEMENT of Electric Light Expenditures and Receipts for the Year ended June 30, 1904.

Districts.	Inspectors.	Expenditures.					Receipts.	
		Salaries.	Special Assistance.	Travelling Expenses.	Sundries.	Totals.	Registration Fees.	Inspection Fees.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Belleville	Johnson, Wm			294 01	10 50	304 51	542 50	399 75
Hamilton	McPhie, D			107 60	5 20	112 80	295 00	1,120 50
London	Nash, A. F			165 50	1 40	166 90	557 50	899 75
Ottawa	Roche, H. G			81 40	12 40	93 80	355 00	1,814 50
Toronto	Johnstone, J. K			248 95	11 99	260 94	785 00	3,380 25
	Ontario			897 46	41 49	938 95	2,535 00	7,614 75
Montreal	Aubin, A		364 00	20 65	11 57	396 22	150 00	3,259 50
Quebec	Levasseur, N			10 41	30 65	41 06	165 00	907 50
Sherbrooke	Simpson, A F			67 95	4 75	72 70	180 00	51 50
St. Hyacinthe	Provost, J. E	300 00		45 15	0 55	345 70	135 00	110 75
Three Rivers	Dufresne, J. U	500 00		61 25	4 70	565 95	60 00	68 25
	Quebec	800 00	364 00	205 41	52 22	1,421 63	690 00	4,397 50
St. John, N.B.	Wilson, J. E			174 83	8 54	183 37	165 00	1,733 50
Halifax, N.S.	Miller, A			197 90	2 75	200 65	365 00	801 75
Charlottetown, P.E.I.	Bell, J. H			14 45	20 36	34 81	40 00	160 25
Winnipeg, Man	Magness, R				11 65	11 65	270 00	1,596 75
Vancouver	Miller, J. F						230 00	1,823 50
Victoria	Jones, R			9 45	10 60	20 05	65 00	695 75
	Br. Columbia			9 45	10 60	20 05	295 00	2,519 25
Dawson							75 00	

RECAPITULATION.

Ontario			897 46	41 14	938 95	2,535 00	7,614 75
Quebec	800 00	364 00	205 41	52 22	1,421 63	690 00	4,397 50
New Brunswick			174 83	8 54	183 37	165 00	1,733 50
Nova Scotia			197 90	2 75	200 65	365 00	801 75
Prince Edward Island			14 45	20 36	34 81	40 00	160 25
Manitoba				11 65	11 65	270 00	1,596 75
British Columbia			9 45	10 60	20 05	295 00	2,519 25
Dawson, Yukon						75 00	
Chief Electrical Engineer	3,131 12		91 11	171 29	3,393 52		
General				1,679 01	1,679 01		
Printing				123 62	123 62		
Stationery				39 74	39 74		
Totals	3,931 12	364 00	1,590 61	2,160 92	8,047 00	4,435 00	18,823 75

N.B.—Refund of $1.00 to be deducted from Registration Fees. (See statement No. 16.)

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

W. J. GERALD,
Deputy Minister.

APPENDIX I.

STATEMENT showing the number of Electric Light Meters Verified, Rejected, and Verified after first Rejection, in each Inspection District, for the Fiscal Year ended June 30, 1904.

Districts.	Number presented.	Verified as within the error tolerated by law.			Rejected.			Verified after first Rejection.		
		Correct.	Fast.	Slow.	Unsound.	Fast.	Slow.	Correct.	Fast.	Slow.
Belleville	315	132	67	116						
Hamilton	810	263	238	306	2		1			
London	795	261	270	261		2	1			
Ottawa	2,135	441	231	1,460	2		1			
Toronto	2,308	573	946	778		9	2			
Montreal	2,702	1,683	868	124	5	5	17			
Quebec	997	329	634	31					1	2
Sherbrooke	41	10	16	14		1				
St. Hyacinthe	99	98			1					
Three Rivers	39	12	13	14						
St. John	1,052	455	309	280		2	3			3
Halifax	611	551	23	22	5	3	5	2		
Charlottetown	158	52	67	38	1					
Winnipeg	1,320	923	151	246						
Vancouver	1,392	362	255	775						
Victoria	802	371	192	239						
Totals	15,576	6,516	4,280	4,704	16	22	30	2	1	5

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1904.

APPENDIX J.

STATEMENT showing the Electric Light Companies registered under the Electric Light Inspection Act, during the Year ended June 30, 1904.

Districts.	From whom Collected.	Serial No.	By whom Collected.	Certificate for Fiscal Year.	Number of Lamps.			Registration Fees.	Totals.
					Arc.	Incandescent.	Totals.		
								$ cts.	$ cts.
Belleville	Marmora Electric Co	1	C. I. R., Belleville	1903 1904	.....	599	599	10 00	
	Steinhoff & Gordon, Tweed	2	" "	"	.....	900	900	10 00	
	Town of Picton	3	" "	"	66	3,000	3,660	25 00	
	Trenton Electric and Water Co. (Ltd.)	4	" "	"	75	7,851	8,601	25 00	
	Frankford Electric Light Co. (Ltd.)	5	" "	"	.....	200	200	5 00	
	M. P. Davis, Mille Roches	1	Cornwall	1903 1904	230	596	2,896	25 00	
	Vankleek Hill Electric Co. (Ltd.)	2	"	"	.....	1,225	1,225	10 00	
	Stormont Electric Light and Power Co., Cornwall	3	"	"	11	1,460	1,600	10 00	
	Corporation of the Town of Alexandria	4	"	"	.....	935	935	10 00	
	Kingston Light, Heat and Power Co	1	Kingston	1903 1904	115	2,900	4,050	25 00	
	Benjamin Manufacturing Co. of Yarker (Ltd.)	2	"	"	.....	200	200	5 00	
	A. A. Connoly, Yarker	3	"	"	.....	125	125	5 00	
	Napanee Water and Electric Light Co. (Ltd.)	4	"	"	24	1,605	1,845	25 00	
	Fenelon Falls Electric Light Co. (Ltd.)	1	Peterborough	1903 1904	.....	800	800	10 00	
	Light, Heat and Power Co. of Lindsay (Ltd.)	2	" "	"	.....	7,000	7,000	25 00	
	Port Hope Electric Light and Power Co. (Ltd.)	3	" "	"	36	1,100	1,460	10 00	
	Cobourg Water and Electric Co. (Ltd.)	4	" "	"	25	4,000	1,250	25 00	
	Colborne Electric Light Co.	5	" "	"	26	770	970	10 00	
	Brighton Electric Light Co	6	" "	"	.....	550	550	10 00	
	D. J. Galbraith, Newcastle	7	" "	"	.....	400	100	5 00	
	Peterborough Light and Power Co. (Ltd.)	8	" "	"	125	4,000	5,250	25 00	
	Water Works and Electric Light Commission, Campbellford	9	" "	"	35	2,140	2,490	25 00	
	Bowmanville Electric Light Co. (Ltd.)	10	" "	"	17	1,398	1,568	10 00	
	Otonabee Power Co. (Ltd.)	11	" "	"	.....	500	500	5 00	
	H. W. Foulds & Co., Hastings	12	" "	"	12	500	620	10 00	
	W. C. Harrison, Norwood	13	" "	"	17	500	670	10 00	
	Belmont Gold Mine (Ltd.) Cordova	14	" "	"	.....	50	50	5 00	
	Lakefield Light and Power Co.	15	" "	"	8	350	130	5 00	
	James Pickering, Millbrook	16	" "	"	6	413	473	5 00	
	Morrisburg Electric Light and Power Works (Municipal)	1	C. I. R., Prescott	1903 1904	.....	2,500	2,500	25 00	
	Cardinal Electric Light Co. (Ltd.)	2	" "	"	.....	1,300	1,300	10 00	

APPENDIX J.—*Continued.*

STATEMENT showing the Electric Light Companies registered under the Electric Light Inspection Act, during the Year ended June 30, 1904.

Districts.	From whom Collected.	Serial No.	By whom Collected.	Certificate for Fiscal Year.	Number of Lamps. Arc.	Incandescent.	Totals.	Registration Fees.	Totals.
								$ cts.	$ cts.
Belleville *Con.*	A. S. Bowen & Sons, Kemptville	3	C. I. R., Prescott	1903-1904	.....	1,000	1,000	10 00	
	Merrickville Electric Light and Power Co.	4	" "	"	1	422	432	5 00	
	Gananoque Electric Light and Water Supply Co. (Ltd.)	5	" "	"	21	1,000	1,210	10 00	
	Water and Light Commissioners, Prescott	6	" "	"	9	2,488	2,578	25 00	
	Brockville Light and Power Department	7	" "	"	66	4,000	4,660	25 00	
	Municipality of the Village of Iroquois	8	" "	"	13	1,054	1,184	10 00	
	International Buckle Co. (Ltd.) Westport	9	" "	(1)	.....	337	337	7 50	
	Eager, Sanderson Co. (Ltd.) Winchester	10	" "	(2)	....	700	700	30 00	
									542 50
Hamilton	Tilsonburg Electric Light Works	1	" Brantford	1903-1904	5	1,200	1,250	10 00	
	Herbert Webster, Norwich	2	" "	"	.....	794	794	10 00	
	James Munro, Embro	3	" "	"	....	407	407	5 00	
	Woodstock Water and Light System	4	" "	"	98	2,600	3,580	25 00	
	Brantford Electric Operating Co., Ltd	5	" "	"	175	10,000	11,750	25 00	
	Simcoe Gas and Water Co. (Ltd.)	6	" "	"	30	.....	30	5 00	
	Brantford Street Railway Co.	7	" "	"	..	200	200	5 00	
	Corporation of the Town of Paris	8	" "	"	26	900	1,160	10 00	
	Ingersoll Electric Power and Light Co.	9	" "	"	37	1,850	2,220	25 00	
	Mrs. Collina Freure, Port Rowan	10	" "	"	11	150	260	5 00	
	H. W. Ansley, Port Dover	11	" "	"	8	200	280	5 00	
	Hamilton Electric Light and Power Co., Ltd.	1	C. I. R., Hamilton	1903-1904	750	15,000	52,500	25 00	
	Hamilton Cataract Power, Light and Traction Co., Ltd.	2	" "	"	.....	250	250	5 00	
	Electric Power and Manufacturing Co., Hamilton	3	" "	"	.....	200	200	5 00	
	Dundas Electric Co., Ltd.	4	" "	"	6	940	1,000	10 00	
	Maple Leaf Rubber Co., Ltd., P. Dalhousie	1	C. I. R., St. Catharines	1903-1904	3	583	613	10 00	
	Corporation of the Town of Thorold	2	" "	"	26	1,277	1,537	10 00	
	Dunnville Electric Light Company., Ltd.	3	" "	"	15	1,266	1,416	10 00	
	Lincoln Electric Light and Power Co., Ltd.	4	" "	"	88	6,100	6,980	25 00	
	Welland Electric Light Co.	5	" "	"	20	350	550	10 00	
	Corporation of the Town of Niagara	6	" "	"	.....	750	750	10 00	
	Corporation of the Town of Niagara Falls	7	" "	"	58	4,000	4,580	25 00	
	Merritton Electric Light Co.	8	" "	"	22	800	1,020	10 00	

(1) For eighteen months ending June 30, 1904.
(2) For three years ending June 30, 1904.

	Hamilton Cataract P'wr Lht and Tract'n Co., Ltd., Beamsville	9	"	"	"	....	425	425	5 00		
	Grimsby Electric Plant	10	"	"	"	..	430	430	5 00		
										295	00
London	London Electric Co., Ltd	1	C.A.R., London		1903 1904	400	27,500	31,500	25 00		
	Cook & Sons, Lucan	2	"	"	"	....	480	480	5 00		
	West Lorne Electric Light Co., Ltd	3	"	"	"	5	305	305	5 00		
	Alvinston Electric Light Plant	4	"	"	"	13	200	330	5 00		
	H. C. Baird & Son, Park Hill	5	"	"	"	12	900	1,020	10 00		
	Sarnia Gas and Electric Light Co	6	"	"	"	800	1,700	9,700	25 00		
	St. Thomas Gas Co	7	"	"	"	110	2,000	3,100	25 00		
	Hamilton & Prout, Forest	8	"	"	"	12	450	570	10 00		
	Corporation of the Town of Strathroy	9	"	"	"	29	2,000	2,290	25 00		
	Petrolia Electric Light, Heat and Power Co., Ltd	10	"	"	"	41	2,735	3,145	25 00		
	Bella A. Gordon, Glencoe	11	"	"	"	22	400	620	10 00		
	Dutton Electric Light Co., Ltd	12	"	"	"	4	600	640	10 00		
	Town of Aylmer Electric Department	13	"	"	"	12	1,000	1,120	10 00		
	Power Equipment Co. of Ontario, Ltd., London	14	"	"	"	14	1,200	1,340	10 00		
	Watford Electric Light Plant	15	"	"	"	14	215	355	5 00		
	Corporation of the Town of Goderich	1	C.A.R., Stratford		1903 1904	34	2,500	2,840	25 00		
	J. A. Williams & Co., Zurich	2	"	"	"	....	280	280	5 00		
	Stratford Gas Co	3	"	"	"	89	3,500	4,390	25 00		
	Palmerston Electric Light Co	4	"	"	"	4	450	490	5 00		
	J. G. Field, Tavistock	5	"	"	"	...	460	460	5 00		
	Corporation of the Town of Mitchell	6	"	"	"	27	750	1,020	10 00		
	Corporation of the Town of St. Mary's	7	"	"	"	31	1,650	1,990	10 00		
	Thomas Welsh, Hensall	8	"	"	"	1	849	859	10 00		
	Exeter Electric Light Co	9	"	"	"	11	900	1,010	10 00		
	Seaforth Electric Light, Heat and Power Co., Ltd	10	"	"	"	42	1,490	1,820	10 00		
	Clinton Electric Light Co	11	"	"	"	14	1,000	1,140	10 00		
	Listowel Gas and Electric Light Co., Ltd	12	"	"	"	....	25	25	5 00		
	C. Reis, Wroxeter	13	"	"	"	...	365	365	5 00		
	Blyth Electric Light Co	14	"	"	"	7	300	370	5 00		
	Wingham Electric Light Co	15	"	"	"	50	2,500	3,000	25 00		
	Brussels Electric Light Co	16	"	"	"	9	450	540	10 00		
	Hiram Walker & Sons, Walkerville	1	C.A.R., Windsor		1903-1904	14	1,690	1,830	25 00		
	People's Electric Co., Windsor	2	"	"	"	9	7,250	7,340	25 00		
	Kingsville Electric Light Co	3	"	"	"	...	900	900	10 00		
	Corporation of the Town of Dresden	4	"	"	"	...	900	900	10 00		
	Corporation of the Town of Bothwell	5	"	"	"	15	350	500	5 00		
	James Galloway, Thamesville	6	"	"	"	..	600	600	10 00		
	Leamington Electric Light Co., Ltd	7	"	"	"	17	1,500	1,670	10 00		
	Chatham Gas Co., Ltd	8	"	"	"	18	5,182	5,362	25 00		
	A. E. Nelson, Tilbury	9	"	"	"	12	375	495	5 00		
	Ridgetown Electric Light Plant	10	"	"	"	10	800	900	10 00		
	Chs. Enos Naylor, Essex	11	"	"	"	8	700	780	10 00		
	Corporation of the Town of Blenheim	12	"	"	"	14	850	990	10 00		
	Amherstburg Electric Light, Heat and Power Co., Ltd	13	"	"	"	.....	900	900	10 00		
	Wallaceburg Electric Light Co., Ltd	14	"	"	"	21	1,400	1,610	10 00		
	Walter Brush Grubb, Harrow	15	"	"	(3)	...	200	200	2 50		
										557	50

(3) For six months ending June 30, 1904.

APPENDIX J—*Continued.*

STATEMENT showing the Electric Eight Companies registered under the Electric Light Inspection Act, during the Year ended June 30, 1904.

Districts.	From whom Collected.	Serial No.	By whom Collected.	Certificate for Fiscal Year.	Number of Lamps.			Registration Fees.	Totals.
					Arc.	Incandescent.	Totals.		
								$ cts.	$ cts.
Ottawa	Ottawa Electric Co	1	C. I. R., Ottawa	1903 1904	887	114,133	123,003	25 00	
	Albert MacLaren, Buckingham	2	" "	"	26	1,950	2,210	25 00	
	Consumers Electric Co., Ltd., Ottawa	3	" "	"	82	12,424	13,244	25 00	
	Deschenes Electric Co., Ltd., Ottawa	4	" "	"	....	2,500	2,500	25 00	
	Hull Electric Co	5	" "	"	20	3,000	3,200	25 00	
	Renfrew Power Co., Ltd	1	C. I. R., Perth	1903 1904	.....	3,000	3,000	25 00	
	Renfrew Electric Co., Ltd	2	" "	"	8	1,360	1,440	10 00	
	Citizens' Electric Co., Smith's Falls	3	" "	"	.....	1,200	1,220	10 00	
	Star Electric Co., Eganville	4	" "	"	....	500	500	5 00	
	Sturgeon Falls Electric Light and Power Co., Ltd	5	" "	"	....	660	660	10 00	
	Pembroke Electric Light Co., Ltd	6	" "	"	21	3,200	3,410	25 00	
	Carleton Place Electric Light Co	7	" "	"	30	1,675	1,975	10 00	
	Smith's Falls Electric Power Co., Ltd	8	" "	"	47	3,000	3,470	25 00	
	Pakenham Electric Light Co	9	" "	"	.....	400	400	5 00	
	Arnprior Electric Light and Power Co., Ltd	10	" "	"	....	3,300	3,300	25 00	
	Canadian Copper Co., Copper Cliff	11	" "	"	33	1,030	1,360	10 00	
	Perth Electric Light Co	12	" "	"	40	.....	40	5 00	
	John Bourke, North Bay	13	" "	"	17	1,500	1,670	10 00	
	Corporation of the Town of Almonte	14	" "	"	16	1,400	1,560	10 00	
	Mattawa Electric Light and Power Co., Ltd	15	" "	"	14	1,096	1,236	10 00	
	Corporation of the Town of Sudbury	16	" "	"	.....	1,800	1,800	10 00	
	Canadian Electric and Water Power Co., Ltd	17	" "	"	..	3,000	3,000	25 00	
									355 00
Toronto	Galt Gas Light Co., Ltd	1	C. I. R., Guelph	1903 1904	60	2,000	2,600	25 00	
	Corporation of the Town of Mount Forrest	2	" "	"	15	900	1,050	10 00	
	George Leighton, Harriston	3	" "	"	18	450	630	10 00	
	Waterloo Electric Light and Power Co	4	" "	"	26	2,500	2,760	25 00	
	Berlin Light Commission	5	" "	"	81	1,000	1,810	10 00	
	Corporation of the Town of Hespeler	6	" "	"	.....	1,000	1,000	10 00	
	Fergus Electric Light and Milling Co	7	" "	"	18	1,312	1,492	10 00	
	Adams Bros., Drayton	8	" "	"	...	250	250	5 00	

Jacob Morley, New Hamburg	9	"	"	"	"	20	300	500	5	00
City of Guelph Light and Power Department	10	"	"	"	"	105	4,114	5,161	25	00
John Sheater, Preston	11	"	"	"	"	...	480	480	5	00
F. Miatz, Preston	12	"	"	"	"	...	...	...	5	00
H. Gruetzner, Hanover	1	C. L. R.,	Owen Sound	1903	1904	34	340	340	5	00
Walkerton Electric Light and Power Co., Ltd	2	"	"	"	"	19	1,552	1,742	10	00
Saugeen Electric Light and Power Co., Ltd., Southampton	3	"	"	"	"	16	1,650	1,810	10	00
H. Cargill & Son, Cargill	4	"	"	"	"	...	1,780	1,780	10	00
N. Wenger & Bros., Ayton	5	"	"	"	"	...	350	350	5	00
Thomas Andrews, Thornbury	6	"	"	"	"	...	150	150	5	00
Canada Furniture Manufacturers, Ltd., Wiarton	7	"	"	"	"	10	550	550	10	00
Kincardine Water Works and Electric Light Board of Commissioners	8	"	"	"	"	16	1,496	1,656	10	00
Teeswater Light and Power Co.	9	"	"	"	"	19	1,085	1,275	10	00
Wm. Moore & Sons, Meaford	10	"	"	"	"	...	374	374	5	00
Walter Stewart & Son, Lucknow	11	"	"	"	"	20	900	1,100	10	00
Minnis Bros., Markdale	12	"	"	"	"	...	430	430	5	00
Bearman & Co., Chesley	13	"	"	"	"	...	700	700	10	00
Corporation of the Town of Collingwood	14	"	"	"	"	25	950	1,200	10	00
Paisley Electric Light Co	15	"	"	"	"	60	3,000	3,600	25	00
Corporation of the Village of Dundalk	16	"	"	"	"	...	750	750	10	00
Corporation of the Town of Owen Sound	17	"	"	"	"	...	500	500	5	00
Crawford & McIntyre, Durham	18	"	"	"	"	15	1,450	1,450	10	00
Fred Deagle, Artemesia	19	"	"	"	"	...	975	975	10	00
Sunderland Electric Power Co., Ltd	1	C. L. R.,	Toronto	1903	1904	1	245	255	5	00
Knight Bros. Co., Burk's Falls	2	"	"	"	"	...	237	237	5	00
Corporation of the Village of Acton	3	"	"	"	"	...	1,000	1,000	10	00
Jordan & Easton, Whitby	4	"	"	"	"	...	1,000	1,000	10	00
Alex. Dobson, Beaverton	5	"	"	"	"	26	850	1,110	10	00
Corporation of the Town of Parry Sound	6	"	"	"	"	3	3,300	340	5	00
Brampton Electric Light Co.	7	"	"	"	"	31	1,500	3,330	25	00
Corporation of the Town of Huntsville	8	"	"	"	"	...	1,500	1,810	10	00
Hamilton Cataract Power, Light and Traction Co., Ltd., Burlington	9	"	"	"	"	...	1,400	1,400	10	00
Penetanguishene and Midland Electric Street Railway, Light and Power Co., Ltd	10	"	"	"	"	15	430	430	5	00
Corporation of the Village of Beeton	11	"	"	"	"	...	1,200	1,350	10	00
J. G. Gould, Uxbridge	12	"	"	"	"	...	750	750	10	00
J. Philip, Grand Valley and Arthur	13	"	"	"	"	11	1,016	1,126	10	00
Corporation of the Town of Barrie	14	"	"	"	"	...	800	800	10	00
C. W. Watson, Orangeville	15	"	"	"	"	51	4,000	4,510	25	00
Aurora Electric Light Co.	16	"	"	"	"	29	1,200	1,490	10	00
Alliston Electric Light Co.	17	"	"	"	"	2	450	170	5	00
Oshawa Electric Light Co. Ltd	18	"	"	"	"	6	1,050	1,110	10	00
Municipality of Weston	19	"	"	"	"	12	1,800	1,920	10	00
Humber Power and Light Co., Ltd., Toronto Junction	20	"	"	"	"	17	186	656	10	00
John Knox, Strayner	21	"	"	"	"	5	100	150	10	00
Tagona Water and Light Co., Sault Ste. Marie	22	"	"	"	"	...	775	775	10	00
Cataract Electric Co	23	"	"	"	"	131	10,884	12,174	25	00
Corporation of the Town o Thessalon	24	"	"	"	"	...	500	500	5	00
		"	"	"	"	13	525	655	10	00

APPENDIX J.—*Continued.*

STATEMENT showing the Electric Light Companies registered under the Electric Light Inspection Act, during the year ended June 30, 1904.

Districts.	From whom Collected.	Serial No.	By whom Collected.	Certificate for Fiscal Year.	Number of Lamps.			Registration Fees.	Totals.
					Arc.	Incandescent.	Totals.		
								$ cts.	
Toronto—*Con.*	Corporation of the Village of Tottenham	25	C.I.R., Toronto	1903-1904	12	500	620	5 00	
	James Pickering, Shelburne	26	" "	"	26	500	760	10 00	
	Corporation of the Village of Markham	27	" "	"		450	450	5 00	
	W. & A. McArthur Co., Ltd., Little Current	28	" "	"	1	60	70	5 00	
	Corporation of the Town of Orillia	29	" "	"	50	4,500	5,000	25 00	
	Georgetown Electric Light and Power Co., Ltd	30	" "	"	52	800	1,320	10 00	
	W. H. Summerfeldt and Sons, Sutton West	31	" "	"		400	400	5 00	
	Corporation of the Town of Bracebridge	32	" "	"		4,500	4,500	25 00	
	Milton Electric Light and Power Co., Ltd	33	" "	"	20	516	716	10 00	
	Corporation of the Town of Newmarket	34	" "	"	2	2,484	2,504	25 00	
	Simon Plewes, Creemore	35	" "	"		500	500	5 00	
	Toronto Electric Light Co., Ltd	36	" "	"	1,500	125,000	140,000	25 00	
	A. B. Mass, Oakville	37	" "	"	26	650	910	10 00	
	Robt. Fielding, Gravenhurst	38	" "	"		1,900	1,900	10 00	
	Town of East Toronto	39	" "	"	28	250	530	10 00	
	Corporation of the Village of Port Perry	40	" "	"	6	600	660	10 00	
	Blind River Electric Light Co.	41	" "	"		450	450	5 00	
	C. E. Copeland, Elmvale	42	" "	"		400	400	5 00	
									785 00
Montreal	Corporation of the Village of Huntingdon	1	C.I.R., Montreal	1903-1904		920	920	10 00	
	Gazette Printing Co., Montreal	2	" "	"		800	800	10 00	
	John T. Ayers, Lachute	3	" "	"		980	980	10 00	
	St. Jerome Power and Electric Light Co., Ltd	4	" "	"		900	900	10 00	
	La Compagnie d'Eclairage Electrique de Terrebonne	5	" "	"		730	730	10 00	
	Valleyfield Electric Co., Ltd.	6	" "	"	94	2,800	3,740	25 00	
	Montreal Light, Heat & Power Co	7	" "	"	3,144	291,974	323,414	25 00	
	Jean Roux, St. Thérèse	8	" "	"		200	200	5 00	
	Corporation of the Town of Lachine	9	" "	"	51	1,750	2,260	25 00	
	Lachute Electric Light Co.	10	" "	"		400	400	5 00	
	Laurentian Water & Power Co.	11	" "	"	1	1,200	1,210	10 00	
	Beauharnois Electric Light Co.	12	" "	"		470	470	5 00	
									150 00

Quebec	La Companie des Eaux et de l'Electricite de Chicoutimi	1	C.I.R.	Quebec	1903-1904		2,000	2,000	10 00	
	Chs. A. Julien, Pont Rouge	2	"	"	"		225	225	5 00	
	M. A. & H. Grandbois, St. Casimir	3	"	"	"		300	300	5 00	
	Quebec & Jacques Cartier Electric Co	4	"	"	"	538	46,550	51,930	25 00	
	Canadian Electric Light Co., Levis	5	"	"	"	16	11,480	11,640	25 00	
	J. Camille Pouliot, Bic	6	"	"	"		200	200	5 00	
	Compagnie Electrique de Roberval	7	"	"	"	2	1,500	1,520	10 00	
	Montmagny Light & Pulp Co	8	"	"	"		2,000	2,000	10 00	
	Quebec Railway, Light & Power Co	9	"	"	"	170	58,000	59,700	25 00	
	Fraserville Co. Ltd	10	"	"	"	10	2,400	2,500	25 00	
	Chas. A Julien, St. Raymond	11	"	"	"		900	900	10 00	
	Compagnie Electrique de la Baie St. Paul	12	"	"	"		450	450	5 00	
	Joseph & Engène Robitaille, Ancienne Lorette	13	"	"	"		125	125	5 00	
										165 00
Sherbrooke	Knowlton Electric Light Co	1	"	"	"		400	400	5 00	
	Richmond County Electric Co.	2	"	"	"		1,862	1,862	10 00	
	La Compagnie d'Eclairage Electrique de Mégantic	3	"	"	"		1,200	1,200	10 00	
	Thos. Crockett, Danville	4	"	"	"		700	700	10 00	
	Parker & Howe, Dixville	5	"	"	"		125	125	5 00	
	Eastern Townships Electric Co.	6	"	"	"		1,000	1,000	10 00	
	Corporation of the Village of Granby	7	"	"	"	40	3,000	3,400	25 00	
	H. A. Warby, Sawyerville	8	"	"	"	1	119	129	5 00	
	N. P. Tanguay, Weedon	9	"	"	"		500	500	10 00	
	Sherbrooke Power, Light & Heat Co	10	"	"	"	91	13,500	14,410	25 00	
	Corporation of the Town of Magog	11	"	"	"		1,800	1,800	10 00	
	Coaticook Electric Light & Power Co	12	"	"	"	25	2,500	2,750	25 00	
	Brome Lake Electric Power Co., Waterloo	13	"	"	"		1,300	1,300	10 00	
	Stanstead Electric Light Co.	14	"	"	"	20	800	1,000	10 00	
	D. Champoux & Bro., D'Israeli	15	"	"	"		500	500	10 00	
										180 00
St. Hyacinthe	Arthabaska Water & Power Co., Victoriaville	1	C.I.R.	St. Hyacinthe	1903-1904		5,157	5,157	25 00	
	La Companie Electrique de Plessisville	2	"	"	"		1,460	1,460	10 00	
	Corporation of Drummondville	3	"	"	"		900	900	10 00	
	Farnham Electric Light Co	4	"	"	"		1,200	1,200	10 00	
	Nelson Buzzell, Cowansville	5	"	"	"		400	400	5 00	
	La Companie de Gaz. Electricité & Pouvoir, St. Hyacinthe	6	"	"	"	35	7,000	7,350	25 00	
	M. S. Connell, Stanbridge East	7	"	"	"		225	225	5 00	
	Corey & Campbell, Bedford	8	"	"	"		725	725	10 00	
	St. John's Electric Light Co	9	"	"	"	18	5,000	5,180	25 00	
	La Compagnie Electrique de Sorel	10	"	"	1904-1905	30	700	1,000	10 00	
										135 00
Three Rivers	La Corporation de la ville de Joliette	1	C.I.R.	Joliette	1903-1904	38	1,928	2,308	10 00	
	Forest & Forest, St. Roch de l'Achigan	2	"	"	"		200	200	5 00	
	North Shore Power Co., Three Rivers	1	C.I.R.	Three Rivers	1903-1904	86	7,500	8,360	25 00	
	L'Electrique de Grand Mère, Shawinigan Electric Co	2	"	"	"		1,780	1,780	10 00	
	Shawinigan Falls	3	"	"	"		1,900	1,900	10 00	
										60 00

APPENDIX J.—*Continued*

STATEMENT showing the Electric Light Companies registered under the Electric Light Inspection Act, during the Year ended June 30, 1904.

Districts.	From whom Collected.	Serial No.	By whom Collected.	Certificate for Fiscal year.	Number of Lamps.			Registration Fees.	Totals.
					Arc.	Incandescent.	Totals.		
								$ cts.	$ cts.
St. John	St. John Railway Co	1	C.P.R. St. John, N.B.	1903-1904	405	11,300	15,350	25 00	
	Carleton Electric Light Co., St. John	2	" "	"	30	500	800	10 00	
	City of Moncton Water & Light Department	3	" "	"	73	6,225	6,955	25 00	
	Corporation of Town of Chatham	4	" "	"	3	2,370	2,400	25 00	
	St. Stephen Electric Light Co	5	" "	"	51	1,477	1,987	10 00	
	Woodstock Electric Light Co., Ltd	6	" "	"	.....	900	900	10 00	
	Sackville Electric Light & Telephone Co	7	" "	"	....	750	750	10 00	
	Sussex Manufacturing Co., Ltd	8	" "	"	3	890	920	10 00	
	Town of Campbellton	9	" "	"	25	1,500	1,750	10 00	
	Fredericton Gas Light Co	10	" "	"	20	709	909	10 00	
	Small & Fisher Co., Ltd., Woodstock	11	" "	"	.....	500	500	5 00	
	Town of Newcastle	12	" "	"	20	1,800	2,000	10,00	
	Kent Electric Co., Ltd., Richibucto	13	" "	"	.....	500	500	5 00	
									165 00
Halifax	Town of Annapolis Royal	1	C. P. R., Halifax	1903-1904	.....	1,000	1,000	10 00	
	Halifax Electric Tramway Co., Ltd	2	" "	"	353	30,000	33,530	25 00	
	John Daly, Digby	3	" "	"	.....	700	700	10 00	
	Town of Liverpool	4	" "	"	.....	1,200	1,200	10 00	
	Dartmouth Gas, Electric Light, Heating and Power Co., Ltd	5	" "	"	....	1,000	1,000	10 00	
	Oxford Electric Light Co., Ltd	6	" "	"	....	500	500	5 00	
	Windsor Electric Light and Power Co., Ltd	7	" "	"	9	2,991	3,081	25 00	
	Acadia Electric Light Co., Wolfville	8	" "	"	.....	1,200	1,200	10 00	
	Kentville Electric Light and Power Co., Ltd	9	" "	"	.....	1,000	1,000	10 00	
	Bear River & Digby Electric Light, Heating and Power Co., Ltd.	10	" "	"	....	475	475	5 00	
	Chambers Electric Light and Power Co., Ltd., Truro	11	" "	"	....	5,000	5,000	25 00	
	Town of Bridgewater	12	" "	"	.....	1,396	1,396	10 00	
	Lunenburg Gas Co., Ltd.	13	" "	"	.....	1,900	1,900	10 00	
	Logan & Co. Electric Works, Shubenacadie	14	" "	"	....	300	300	5 00	
	Yarmouth Street Railway Co., Ltd	15	" "	"	....	200	200	5 00	
	Canada Electric Co., Ltd., Amherst	16	" "	"	15	3,000	3,150	25 00	
	Bridgetown Electric Light and Power Co., Ltd	17	" "	"	.....	450	450	5 00	
	Edison Electric Light and Power Co. of Spring Hill., Ltd	18	" "	"	4	750	790	10 00	

	Town of Parrsboro' Electric Light Plant	1	" "	"		23	1,000	1,230	10 00	
	Antigonish Electric Co.	1	C. I. R., Pictou	1903	1904		1,000	1,000	10 00	
	New Glasgow Electric Light Co., Ltd.	2	" "	"		26	5,000	5,260	25 00	
	Port Hood Development Co	3	" "	"		1	321	331	5 00	
	Cape Breton Electric Co., Ltd., Sydney	4	" "	"		49	11,365	11,855	25 00	
	Cape Breton Electric Co., Ltd., North Sydney	5	" "	"		28	2,974	3,254	25 00	
	Town of Glace Bay	6	" "	"			3,450	3,450	25 00	
	Cape Breton Electric Co., Ltd., North Sydney	1	" "	1904	1905			3,500	25 00	
										365 00
Charlottetown	Montague Electric Co., Ltd	1	C. I. R., Charlottetown	1903	1904		400	400	5 00	
	Summerside Electric Co	2	" "	"		20	1,400	1,600	10 00	
	Charlottetown Light and Power Co., Ltd	3	" "	"		80	8,000	8,800	25 00	
										40 00
Winnipeg	Calgary Water Power Co., Ltd	1	C. I. R., Calgary	1903	1904	25	2,250	2,500	25 00	
	Lethbridge Water Works and Electric Light Co., Ltd	2	" "	"			1,400	1,400	10 00	
	Municipality of the Town of Edmonton	3	" "	"		22	2,740	2,960	25 00	
	Board of Water and Light Commissioners, Fort William	1	C. I. R., Port Arthur	1903	1904	40	3,500	3,900	25 00	
	Corporation of the Town of Port Arthur	2	" "	"			3,805	3,805	25 00	
	W. J. Bruce & Co., Selkirk	1	C. I. R., Winnipeg	1903	1904		1,010	1,010	10 00	
	Winnipeg Electric Street Railway Co	2	" "	"		50	26,000	26,500	25 00	
	Corporation of the Town of Neepawa	3	" "	"		16	1,500	1,660	10 00	
	Boissevain Light and Power Co.	4	" "	"			200	200	5 00	
	Regina Electric Light and Power Works	5	" "	"		4	1,800	1,840	10 00	
	Central Electric Co., Ltd., Portage la Prairie	6	" "	"		11	2,500	2,610	25 00	
	Town of Prince Albert	7	" "	"			500	500	5 00	
	Citizens' Telephone and Electric Co. of Rat Portage, Ltd.	8	" "	"		21	4,343	4,553	25 00	
	Brandon Electric Light Co., Ltd.	9	" "	"		25	9,975	10,225	25 00	
	Carman Electric Light and Power Co., Ltd	10	" "	"		4	435	175	5 00	
	M. Vanalstine, Morden	11	" "	"			750	750	10 00	
	Minnedosa Electric Light and Power Co.	12	" "	"		4	306	346	5 00	
										276 00
Vancouver	Corporation of the City of New Westminster	1	C. I. R., Vancouver	1903	1904	100	6,000	7,000	25 00	
	Corporation of the City of Kamloops	2	" "	"			2,350	2,350	25 00	
	Corporation of the City of Nelson	3	" "	"		9	4,200	4,290	25 00	
	West Kootenay Power and Light Co., Ltd	4	" "	"		47	4,750	5,220	25 00	
	Crows Nest Pass Electric Light and Power Co., Ltd., Fernie	5	" "	"			1,286	1,286	10 00	
	Phœnix Electric Light Co., Ltd	6	" "	"			598	598	10 00	
	Corporation of the City of Vernon	7	" "	"			700	700	10 00	
	Kootenay Electric Co., Ltd.	8	" "	"			830	830	10 00	
	Canadian Smelting Works, Trail	9	" "	"		46	1,000	1,160	10 00	
	Greenwood Electric Co., Ltd	10	" "	"		3	1,170	1,200	10 00	
	Corporation of the City of Revelstoke	11	" "	"		5	1,500	1,550	10 00	
	Sandon Water Works and Light Co., Ltd	12	" "	"		3	875	905	10 00	
	Cranbrook Electric Light Co., Ltd	13	" "	"		1	936	946	10 00	
	Corporation of the City of Grand Forks	14	" "	"		8	1,500	1,580	10 00	
	British Columbia Electric Light and Ry. Co., Ltd., Vancouver	15	" "	"		553	57,375	62,905	25 00	
	British Columbia Power and Manufacturing Co., Ltd., Atlin	16	" "	"			140	140	5 00	
										230 00

APPENDIX J—*Concluded.*

STATEMENT showing the Electric Light Companies registered under the Electric Light Inspection Act, during the Year ended June 30, 1904.

Districts.	From whom Collected.	Serial No.	By whom Collected.	Certificate for Fiscal Year.	Number of Lamps.			Registration Fees.	Totals.
					Arc.	Incandescent.	Total.		
								$ cts.	$ cts.
Victoria	Victoria Electric Co., Ltd	1	C. I. R., Victoria	1903-1904	2	304	324	5 00	
	Nanaimo Electric Light, Power and Heating Co., Ltd	2	" "	"	63	1,900	2,530	25 00	
	Cumberland Electric Lighting Co	3	" "	"		1,400	1,400	10 00	
	British Columbia Electric Lighting Co., Ltd., Victoria	4	" "	"	1,755	34,445	51,995	25 00	
	Dawson Electric Light and Power Co., Ltd	1	C. I. R., Dawson	‡	2	4,500	4,520	75 00	140 00
									4,435 00
	LESS—Refund as per Statement No. 16								1 00
									4,434 00

‡ From July 1, 1900, to June 30, 1904.

REPORT, RETURNS AND STATISTICS

OF THE

INLAND REVENUES

OF THE

DOMINION OF CANADA

FOR THE FISCAL YEAR ENDED JUNE 30

1904

PART III

ADULTERATION OF FOOD

PRINTED BY ORDER OF PARLIAMENT

OTTAWA:
PRINTED BY S. E. DAWSON, PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1905

CONTENTS.

REPORT

OF THE

DEPUTY MINISTER OF INLAND REVENUE.

INSPECTION OF FOODS, DRUGS AND FERTILIZERS.

To the Honourable L. P. BRODEUR,
Minister of Inland Revenue.

SIR,—I have the honour to submit herewith the reports of the official analysts of the Dominion for the fiscal year ended June 30, 1904.

The following is a summary statement of the whole number of samples analysed, and results reported, by them :—

Description of Samples.	Genuine.	Doubtful.	Adulterated.	Total.
Milk	76	15	17	108
Fertilizers as sold	59	29	8	96
Maple sugar	1	0	3	4
Maple Syrup	2	0	3	5
Total	138	44	51	213

The following is a summary of the number of collected samples analysed by the Chief Analyst and his staff at the Inland Revenue Laboratory in Ottawa :—

Description of Samples.	Genuine.	Doubtful.	Adulterated.	Total.
Flavouring extracts	3	61 (1)	24 (1)	88
Honey	81	5	13 (2)	99
White lead in oil	100	35 (3)	12 (3)	147
Distilled liquors	109	107 (4)	0	216
Milk	87	19	10	116
Cider	27	0	14 (5)	41
Ground spices	88	7	93	188
Jams and jellies	14	5	55 (6)	74
Wheaten flour	75	0	0	75
Tea	73	0	0	73
Coffee	45	11	19 (7)	75
Milk not described in Bulletin 93	10	1	1	12
Total	712	251	241	1,204

(1) Artificially colored, or flavour not genuine.
(2) Adulterated with cane sugar or glucose.
(3) Indicated as 'adulterated' or 'doubtful' but not sold as 'pure' and therefore not contrary to the provisions of the Act.
(4) Diluted with water and pronounced doubtful as compared with standards established by the British 'Sale of Food Amendment Act.'
(5) Contained small quantities of Salicylic Acid.
(6) The presence of foreign fruit or glucose deemed to constitute adulteration.
(7) Of these three were sold as mixtures.

The following statement shows the total number of samples examined during the fiscal year ended June 30, 1901, 1902, 1903 and 1904 respectively :—

	During the Fiscal Year ended June 30.			
	1901.	1902.	1903.	1904.
1. Number of samples collected by the food inspectors for examination	885	883	541	1,417
2. Number of these samples examined by the public analysts.	881	883	163	213
3. Number of these samples examined in the laboratory here.	243	270	425	1,341
4. Number of samples examined at the laboratory here, duplicates of which were not analysed by the public analysts	802	600	1,017	1,808
This number however includes the following :—				
Samples of beer	25	32	70	15
" vinegar	413	346	366	239
Standard fertilizers	102	106	128	111
Sundry others	.....	...	....	83
Samples examined for other departments :—				
Marine and Fisheries	3	15	8	1
Public Works	0	3	0	0
Militia and Defence	0	3	16	5
Indian Affairs	0	6	2	2
Agriculture	0	15	3	0
Police Branches	1	1	0	1
Interior	0	2	0	3
Trade and Commerce	2	0	0	0
Railways and Canals	0	0	97	7
Customs	0	0	4	0

The Chief Analyst in his report refers to the desirability of establishing, at an early date, standards of purity for food.

This subject is one that has been under consideration by the Department for several years past, but in view of the fact that very few of the older nations have yet seen their way, except in respect of a very limited number of articles, to establish such standards it is felt that the information at our service is not yet sufficiently complete to enable Canada to take definite action in a matter of such great importance.

In England, no legal standard for food, with the single exception of milk, exists. In France, Germany and other European countries standards for certain specific articles have been fixed, but the matter, as a whole, is still under consideration, while in the United States a serious effort is being made to secure data to enable standards to be determined and legalized. In some specific cases standards have been so legalized and marked progress is being made towards extending the list to embrace a greater number of articles. This Department is watching the procedure of the outside world and will not fail to make use of all experience gained.

I have the honour to be, sir,

Your obedient servant,

W. J. GERALD,

Deputy Minister.

Inland Revenue Department,
Ottawa, January 3, 1905.

REPORT OF CHIEF ANALYST.

317 QUEEN STREET,
OTTAWA, December 3, 1904

W. J. GERALD, Esq.,
Deputy Minister of Inland Revenue,

SIR,—I beg to submit the following report for the year ended June 30, 1904, regarding the work of this branch.

The following statement, made out as you have instructed, gives the number of food and other samples examined during the year :—

1. Number of samples collected by the food inspectors for examination		1,417
2. Number of these examined by the district analysts		213
3. Number of these examined in the Inland Revenue Laboratory at Ottawa (1204 + 137)		1,341
4. Number of sample analysed in the Inland Revenue Laboratory, duplicates of which were not examined by the district analysts		1,808
The last mentioned number, however, includes the following :—		
Standard fertilizers		111
Inland Revenue samples :—		
Beer	15	
Vinegar	239	
Sundry others	83	
		337
Samples examined for the following Departments :—		
Marine and Fisheries	1	
Railways and Canals	7	
Militia and Defence	5	
Indian Affairs	2	
Interior	3	
North-west Mounted Police	1	
		19
		467

I beg to call your attention to the very considerable progress which has recently been made in the United States in establishing legal standards of purity for food, much of which is recorded in Circular No. 10, from the office of the Secretary of the United States Department of Agriculture. These standards are similar in many cases to those proposed by me at various times, and recapitulated in my report of January 2, 1901. From a passage in the above mentioned circular it appears that 'before the adoption of 'any schedule, it was submitted to the manufacturing firms and the trade immediately 'interested for criticism, and when requested by them, conferences for discussion have 'been arranged.' I would respectfully recommend the adoption of this course with the manufacturers and wholesale merchants of Canada, not only with reference to establishing standards for pure articles of food, but also in regard to those which are sold under the Adulteration Act as 'compounds' or 'mixtures.'

I have the honour to be, sir,
Your obedient servant,

THOMAS MACFARLANE,
Chief Analyst.

66 Bedford Row,
Halifax, N.S., December 17, 1904.

The Deputy Minister of Inland Revenue,
Ottawa.

Sir,—I have the honour to submit my annual report on the samples of food &c., received by me for analysis during the year ending June 30, 1904.

—	Genuine.	Doubtful.	Adulterated.	Total.
Milk	16	7	1	24
Fertilizers	18	6	2	26
Total	34	13	3	50

I have the honour to be, sir,
Your obedient servant,
MAYNARD BOWMAN,
Official Analyst.

112 St. François-Xavier Street,
Montreal, November 24, 1904.

The Deputy Minister,
Department of Inland Revenue,
Ottawa.

Dear sir,—I have the honour to submit my report of analyses made during the fiscal year ending June 30, 1904.

I have analysed 65 samples, namely:
24 samples of milk.
32 samples of fertilizer.
5 samples of maple syrup.
4 samples of maple sugar.

The results of my analyses are stated in the following tabular form:

—	Genuine.	Doubtful.	Adulterated.	Total.
Milk	18	4	2	24
Fertilizers	15	14	3	32
Maple sugar	1	0	3	4
" syrup	2	0	3	5
Total	36	18	11	65

The 14 samples of fertilizer were not registered, and therefore, are classed as doubtful. Those marked adulterated did not conform to the requirements of the Fertilizer Act.

In the case of the maple syrups, three samples were largely composed of cane syrup. Cane sugar is also the adulterant present in the adulterated maple sugars.

I have the honour to be, sir,
Your obedient servant,
J. T. DONALD.

WINNIPEG, December 19, 1904.

The Commissioner of Inland Revenue,
Ottawa.

SIR,—I beg to report the results of analyses of samples analyzed during the year ending June 30, 1904.

Milk. 18 samples, 16 genuine and 8 adulterated.

Fertilizers. 10 samples, 5 genuine and 5 doubtful.

Your obedient servant,
EDGAR B. KENRICK.

PUBLIC ANALYST'S OFFICE, VICTORIA, B.C.
December 5, 1904.

To the Commissioner of Inland Revenue,
Ottawa.

SIR,—I beg to submit report for year ending June 30, 1904 :

Samples.	Genuine.	Adulterated	Total.
Milk	16	2 Watered.	18
Fertilizers	8		8
Total	24	2	26

I have the honour to be, sir,
Your obedient servant,
C. J. FAGAN.

SCHOOL OF PRACTICAL SCIENCE,
TORONTO, November 29, 1904.

The Commissioner of Inland Revenue,
Ottawa.

SIR,—I beg to submit the following report of the work done under the Adulteration Act in my laboratory during the year.

In December 1903 I analyzed 24 samples of milk, of which I reported 16 as genuine 4 as adulterated and 4 as doubtful. The samples reported adulterated had all been mixed with water. The doubtful samples were so reported, because they were below the average in respect to total solids.

In April, 1904, I analyzed 20 samples of fertilizers, of which I reported 13 genuine, three as below guarantee and four as not registered according to the Act.

The following is a tabular statement of my work.

	Genuine.	Adulterated.	Doubtful.	Total.
Milk	16	4	4	24
Fertilizers	13	3	4	20
Total	29	7	8	44

I have the honour to be, sir
Your obedient servant,
W. HODGSON ELLIS.

APPENDIX B.—Inspection of

Date.	Nature of Sample.	Number of Sample.	Name and Address of Vendor.	Water.	Ethyl Ether Extract.
1904.			*Official Analyst, Dr. J. T. Donald, Montreal.*	p. c.	p. c.
Apr. 18..	Maple Syrup "Semper Idem" brand, labelled choice Quebec Maple Syrup, Wm. Koch, Montreal.	25301	Imperial Syrup Co., 88 Grey Nun's St., Montreal.	37·73	0·08
" 18	Maple Syrup "Imperial" brand, labelled Maple Syrup.	25302	" " ..	29·54	0·27
" 18..	Maple Syrup labelled "Beaver" brand, Montreal Maple Co.	25303	" " ..	36·94	0·04
" 18..	Maple Sugar.....	25304	" " ..	7·70	0·30
" 18 .	Maple Sugar, 2nd grade.....	25305	" " ..	9·63	0·68
" 20 .	Maple Syrup.....	25306	J. L. Jenne, Sutton, P.Q.. .	31·85	0·10
" 20..	Maple Syrup, guaranteed pure	25307	" " ..	31·72	0·16
" 20..	Maple Sugar....	25308	" " ..	10·34	1·04
" 20..	"	25309	" " ..	10·23	0·47

SESSIONAL PAPER No. 14

Maple Syrup and Maple Sugar.

Result of Analysis.

Alcohol Extract.	Residue.	Direct Saccharimeter Reading.	Cane Sugar by Clerget.	Reducing sugar expressed as Glucose.	Total Ash.	Name of Analyst.	Remarks.
p. c.	p. c.		p. c.	p. c.	p. c.		
61·53	0·55	59·80	60·15	2·29	0·115	Dr. J. T. Donald.	Adulterated, being largely cane syrup.
68·85	1·17	61·80	63·77	4·73	0·181	" "	" "
62·56	0·38	61·30	61·28	1·30	0·079	" "	" "
91·57	0·43	91·00	90·90	1·87	0·153	"	Largely composed of cane sugar
86·80	2·06	84·90	85·78	3·60	0·825	"	Genuine maple sugar.
67·06	0·60	65·30	65·50	1·21	0·389	....	Genuine maple syrup.
66·75	0·94	64·40	65·43	1·00	0·430	....	" "
87·35	0·94	87·20	88·04	3·61	0·334	....	Adulterated by the addition of cane sugar.
87·03	1·45	84·60	86·99	3·60	0·776	. ...	" "

APPENDIX A.—Inspection of Whole Milk.

Date.	Nature of Sample.	Number of Sample.	Name and Address of Vendor.	Name and Address of Furnisher.	Result of Analysis.					Remarks.
					Specific Gravity at 15° C.	Water.	Butter Fat.	Other Solids.	Total Solids.	
1901.			*Official Analyst, Mr. M. Bowman, Halifax.*			p. c.	p. c.	p. c.	p. c.	
Apr. 26	Whole Milk	23839	Thomas R. Duncan, Campbellton, N.B.	Vendor	1·032	87·58	3·84	8·58	12·42	Genuine Average milk.
" 26	"	23840	A. F. Chamberlin, Campbellton, N.B.	"	1·033	86·81	3·71	9·48	13·19	" "
" 26	"	23841	Robert Nelson, Campbellton, N.B.	"	1·0309	86·81	4·68	8·51	13·19	Genuine and rich.
" 26	"	23842	John Mair, Campbellton, N.B.	"	1·0309	86·40	4·53	9·07	13·60	" "
" 26	"	23843	William Pratt, Campbellton, N.B.	"	1·0330	86·92	3·62	9·46	13·08	Genuine average milk.
" 27	"	23844	George Duncan, Campbellton, N.B.	"	1·0289	88·92	1·18	6·90	11·08	Under average in total solids and solids not fat, a rich milk or an admixture of milk and cream watered.
" 27	"	23845	Mrs. David Gerard, Campbellton, N.B.	"	1·0299	89·09	2·83	8·08	10·91	Watered.
" 27	"	23846	Mrs. J. B. Gerard, Campbellton, N.B.	"	1·0309	86·69	4·34	8·97	13·31	Genuine and rich.
" 27	"	23847	Charles Coes, Campbellton, N.B.	"	1·0309	85·73	4·97	9·30	14·27	Genuine and very rich
" 27	"	23848	H. R. Murray, I. C. R. Depot, Campbellton, N.B.	Charles Coes, Campbellton, N.B.	1·0309	87·00	1·19	8·81	13·00	Genuine and rich.
" 27	"	23849	Angus McKenzie, Campbellton, N.B.	John Mair, Addington Parish, N.B.	1·0309	86·39	4·40	9·21	13·61	" "
" 27	"	23850	" "	William Pratt, Addington Parish.	1·0309	86·76	1·04	9·20	13·24	" "

APPENDIX C.

BULLETIN No. 89--FLAVOURING EXTRACTS

OTTAWA, September 8, 1903.

W. J. GERALD, Esq.,
Deputy Minister of Inland Revenue.

SIR,—I beg to transmit herewith enclosed a report by Mr. McGill on the samples of flavouring extracts which were collected in accordance with your instructions of March 27 last. The nature of these samples, together with the names of the vendors and manufacturers, are detailed in Table I which is appended to this report. The numbers of the samples, as collected by the food inspectors, are also given in this table, and by means of these numbers the results of the examination of each sample may be traced in Mr. McGill's report and tabulated statements. The latter are six in number and bear the following titles:—

II. Commercial Extract of Lemon.
III. Commercial Extract of Vanilla.
IV. Flavouring Essences.
V. Essence of Peppermint.
VI. Essence of Raspberry.
VII. Essence of Strawberry.

I have the honour to be, sir,
Your obedient servant,

THOMAS MACFARLANE,
Chief Analyst.

I.—List of Samples of Flavouring Extracts as collected in 1903.

DISTRICT OF HALIFAX.

Date of Collection	Nature of Sample.	Number of Sample.	Name and Address of Vendor.	Quantity.	Cost.	Name and Address of Manufacturer or Furnisher as given by Vendor.
1903.					cts.	
April 16.	Extract of lemon	20236	Cain Bros., Yarmouth	3 bottles.	0 30	Dearborn & Co., St. John.
" 16.	" "	20237	J. A. Craig, Yarmouth	3 "	0 30	Vendor.
" 20.	" rose	20250	Murphy & Demont, Windsor	3 "	0 30	Simson Bros., Halifax.
" 20.	" raspberry	20251	" "	3 "	0 30	H. Jonas, Montreal.
" 20.	" lemon	20254	Shand Bros., Windsor	3 "	0 30	J. B. Black, Truro, N.S.
" 20.	" vanilla	20255	" "	3 "	0 30	" "
" 20.	" almond	20258	Wentworth Stores, Ltd., Windsor	3 "	0 30	Dearborn & Co., St. John.
" 22.	" "	20305	A. F. Ross, Truro, N.S.	3 "	0 30	H. Jonas, Montreal.
" 22.	" lemon	20308	R. T. Forristall, Halifax	3 "	0 30	Imperial Extract Co., Toronto.
" 22.	" vanilla	20309	" "	3 "	0 30	" "
" 17.	" lemon	4321	Geo. Rackham, Charlottetown	6 ounces.	0 60	
" 20.	" vanilla	4326	J. A. Gourlie, Summerside	6 "	0 60	
" 20.	" almond	4328	" "	6 "	0 60	
" 20.	" vanilla	4338	John Knight, Georgetown	6 "	0 75	
" 20.	" lemon	4339	" "	6 "	0 54	

DISTRICT OF NEW BRUNSWICK.

April 11.	Extract of vanilla	17857	F. E. Williams Co., Ltd., cor. Princess and Charlotte streets, St. John	3 bottles.	0 60	McLaren's, Hamilton.
" 11.	" lemon	17858	Van Wart Bros., cor. Duke and Charlotte streets, St. John	3 "	0 60	Seeley Manufacturing Co., Detroit, U.S.
" 16.	" vanilla	17875	King-Ashbell Co., Broad street, Sussex	3 "	0 60	Toronto Coffee and Spice Co.
" 14.	" almond	17870	James Collins, Union street, St. John	3 "	0 60	Seeley Manufacturing Co., Detroit.
" 17.	" peppermint	17884	W. G. Bell, 314 Main street, Moncton	3 "	0 45	Bennett Chemical Co., Toronto.
" 18.	Flavouring extract	17893	Robertson & Givan, Main and Duke streets, Moncton	3 "	0 60	Seeley Manufacturing Co., Detroit.
" 21.	Extract of lemon	17897	S. C. Stewart, King street, St. Stephen	3 "	0 90	Baird Co., Ltd., Woodstock, N.B.
" 22.	" cinnamon	17902	H. E. Hill, King street, St. Stephen	3 "	0 60	H. Jonas, Montreal.
" 25.	" pineapple	17912	W. R. Logan, Fredericton	3 "	0 45	Pure Gold Manufacturing Co., Toronto.
" 25.	" wintergreen	17914	H. C. Jewett, Regent street, Fredericton	3 "	0 30	Baird Co., Ltd., Woodstock, N.B.

DISTRICT OF QUEBEC.

April 17	Extract of vanilla	23344	H. Robert, St. Hyacinthe	3 bottles	0 30	J. V. Boudrias, Montreal.
" 20	" "	23348	Victor Trudeau, St. Lambert	3 "	0 45	A. Huckels & Co., Ottawa.
" 21	" "	23358	Gerard Harbière, Lacolle	3 "	0 30	Mayelle & Co., Toronto.
" 22	" peppermint	23359	Smallman & Vass, Lacolle	3 "	0 30	Brayley & Sons, Montreal.
" 22	" "	23360	" "	3 "	0 45	Davis-Lawrence Co., Montreal.
" 28	" cloves	23375	L. S. Plamondon, South Durham	3 "	0 30	" "
" 28	" lemon	23374	" "	3 "	0 30	Hudon & Orsoli, Montreal.
" 29	" orange	23380	Ronnald Piette, Berthierville	3 "	0 30	Hudon & Hebert Co., Montreal.
May 1	" raspberry	23387	J. E. Pichette, Joliette	3 "	0 75	F. F. Dalley Co., Ltd., Hamilton.

DISTRICT OF MONTREAL.

April 28	Extract of vanilla	21307	A. Archambault, 2045 St. James st., St. Henri	5 bottles	0 50	H. Jonas, Montreal.
" 28	" lemon	21308	Z. Trudeau, Notre Dame street, St. Henri	5 "	0 23	
" 29	" raspberry	21309	A. Laing, 2023 Notre Dame, Montreal	5 "	0 40	Laporte, Martin & Co., Montreal.
April 29	Extract of strawberry	21310	A. Laing, 2023 Notre Dame street, Montreal	5 bottles	0 40	Laporte, Martin & Co., Montreal.
" 29	" vanilla	21311	" " "	5 "	0 40	" "
May 6	" "	21312	Keddy & Kenny, Hemmingford	5 "	0 50	L. Silverman, Montreal.
" 7	Cochineal	21313	C. Bisson, St. Vincent de Paul	5 "	0 50	Jos. Contant "
" 7	Extract of lemon	21314	" "	5 "	0 50	" "
" 7	" cinnamon	21315	W. P. Brennan, St. Therese	3 "	0 60	H. Jonas "
" 7	" vanilla	21316	" "	3 "	0 60	" "

DISTRICT OF KINGSTON.

April 20	Extract of pineapple	23147	H. T. Hamly, Walton street, Port Hope	5 bottles	0 40	Imperial Extract Co., Toronto.
" 20	" "	23148	D. J. McDonald, Pitt street, Cornwall	3 "	0 60	F. F. Dalley Co., Hamilton.
" 20	" vanilla	23149	" "	3 "	0 60	" "
" 20	" raspberry	23150	" "	5 "	0 50	" "
" 20	" strawberry	23151	" "	5 "	0 50	" "
" 20	" vanilla	23152	W. H. Dunkin "	5 "	0 75	Seeley Manufacturing Co., Detroit
" 20	" lemon	23153	" "	5 "	0 75	" "
" 20	" "	23154	" "	5 "	0 50	" "
" 20	" cochineal	23155	" "	5 "	0 50	" "
" 20	" raspberry	23156	" "	5 "	0 50	" "

1. List of Samples of Flavouring Extracts as collected in 1903 *Continued.*

DISTRICT OF TORONTO.

Date of Collection	Nature of Sample.	Number of Sample.	Name and Address of Vendor.	Quantity.	Cost.	Name and Address of Manufacturer or Furnisher as given by Vendor.
1903.					$ cts.	
April 15..	Extract of lemon	23431	F. Patience, 429 Yonge street, Toronto	5 bottles.	0 38	Imperial Extract Co., Toronto.
" 15..	" "	23432	" " "	5 "	0 25	J. M. Lowe, Toronto.
" 15..	" vanilla	23433	Hobley Bros., Dunlop street, Barrie..	5 "	0 50	Tropical Extract Co., Toronto.
" 17..	" strawberry	23434	C. H. Peebles, Market Square, Hamilton	5 "	0 40	F. F. Dalley Co., Hamilton.
" 17..	" raspberry	23435	" " "	5 "	0 40	" "
" 17..	" lemon	23436	" " "	5 "	0 60	" "
" 18..	" "	23102	Bradley & Son, St. Paul street, St. Catharines..	5 "	0 25	Pure Gold Manufacturing Co., Toronto.
" 18..	" vanilla	23104	" " "	5 "	0 42	Todhunter & Mitchell, Toronto.
" 18..	" wintergreen	23105	" " "	5 "	0 42	" "
" 20..	" lemon	23115	E. Brown, George street, Peterboro	5 "	0 60	F. F. Dalley Co., Hamilton.

DISTRICT OF WINDSOR.

April 9..	Extract of lemon	22043	J. W. Irwin, Clinton, Ont.	3 bottles.	0 30	London Coffee and Spice Co.
" 9..	" vanilla	22045	Sturdy & Co., Goderich, Ont.	3 "	0 30	" "
" 13..	" "	22048	E. O'Flaherty, Stratford, Ont.	3 "	0 30	Imperial Extract Co., Toronto.
" 13	Flavouring extract	22052	W. W. Hill, Mitchell, Ont.	3 "	0 30	Gorman & Eckhart, London.
" 13	Extract of strawberry..	22055	Wm. Stoneman, Mitchell	3 "	0 30	Warren Bros., Toronto.
" 15	" vanilla	22061	Peter Dill, Seaforth, Ont	3 "	0 30	Imperial Extract Co., Toronto.
" 16	Flavouring extract	22066	Stuebing & Co., Berlin	3 "	0 30	F. F. Dalley, Hamilton.
" 17..	" "	22075	John Sloan & Co., Galt	3 "	0 30	Seeley Manufacturing Co , Detroit.
" 18..	Extract of vanilla	22076	J. A. McCrea, Guelph	3 "	0 30	Vendor.
" 18..	" "	22077	" "	3 "	0 75	McLaurins, Hamilton.

DISTRICT OF WINNIPEG.

April 15..	Flavouring extract	17431	H. Meikle, Morden	8 ozs.	1 95	Seeley Manufacturing Co., Hamilton.
" 17..	"	17437	C. E. Gutteridge, Deloraine		0 75	Mayells & Co., Toronto.
" 21..	"	17444	N. Rosen, Virden	3 bottles	0 75	F. F. Dalley, Hamilton.
" 23..	"	17447	White & Co., Moosomin	3 "	0 60	Balfour & Co., Hamilton.
" 24..	"	17450	Mutter & Lynch, Brandon	3 "	0 75	Pure Gold Manufacturing Co., Toronto.
" 24..	Strawberry extract	17455	Miss A. Jones, Carberry	3 "	0 75	Blue Ribbon Manufacturing Co., Winnipeg.
" 25..	Extract of banana	17458	C. S. B. Burley, Portage la Prairie	3 "	0 75	Pure Gold Manufacturing Co., Toronto.
May 6..	" lemon	17466	Bailey's Fair, Winnipeg	3 "	0 30	Dyson Co., Winnipeg.
" 6..	" vanilla	17468	Burke Bros., Winnipeg	3 "	0 60	Imperial Extract Co., Toronto.
" 6..	Flavouring extract	17471	A. Hendry, Winnipeg	3 "	0 75	Sheriffs, Toronto.

DISTRICT OF MANITOBA.

April 21..	Extract of lemon	21714	Postell & Co., Red Deer	3 bottles	1 20	Seeley Manufacturing Co., Hamilton.
" 23..	" vanilla	21718	R. A. Dickson, Wetaskiwin	3 "	1 80	" " "
" 24..	" lemon	21720	Ross Bros., Edmonton	3 "	1 35	Dalley, Winnipeg.
" 25..	" "	21721	Bowers & Morrison, Strathcona	3 "	1 05	Eby & Blain, Toronto.
" 29..	" vanilla	21727	W. Pitman, Calgary	3 "	0 75	Dominion Extract Co.

DISTRICT OF BRITISH COLUMBIA.

April 16..	Flavouring extract	21688	A. T. Charleton, Port Stanley	2 bottles	0 35	Snow Drift Baking Powder Co.
" 16..	Extract of lemon	21691	H. Alder, Mount Lehman	3 "	0 75	D. S. Curtis, New Westminster.
" 17..	" almond	21695	A. C. Henderson, Chilliwack	3 "	0 75	B. C. Fruit Canning and Spice Co.
" 17..	" orange	21696	" "	3 "	0 75	Blue Ribbon Manufacturing Co., Hamilton
" 17..	" apricot	23501	G. R. Ashwell & Sons, Chilliwack	3 "	0 75	W. Tufts & Son, Vancouver.
" 17..	" lemon	23505	Mrs. E. A. Farrer, Chilliwack	3 "	0 75	Dyson-Gibson Co., Winnipeg.
" 18..	" wintergreen	23508	Harrison River Mills Timber and Trading Co.	3 "	0 45	Langley & Henderson, Victoria.
" 18..	" vanilla	23510	M. Desbresay, Mission, B.C.	3 "	0 75	Great West Spice Co., Winnipeg.
" 22..	" lemon	23525	Marshall Smith, Ladner's Landing	3 "	0 45	Woods, Ladner's Landing.
" 28..	" vanilla	23518	Pamett & Gano, New Westminster	3 "	0 50	McLaren, Hamilton.

LABORATORY OF THE INLAND REVENUE DEPARTMENT.

OTTAWA, September 4, 1903.

THOMAS MACFARLANE, Esq., F.R.S.C.,
Chief Analyst.

SIR,—I have the honour to hand you, in tabular form, with appended notes, the results of work upon a large number of samples of flavouring essences; as also upon two samples of cochineal extract, which does not properly come under this head, being used for colouring rather than for flavouring.

Since no generally accepted standards exist for the preparation of these substances, I have thought it sufficient to ascertain the absence of matters dangerous to health; and I find nothing that can be condemned on this score. The question of foreign colouring matter, in its relation to health, must be considered an open one for the present.

The small quantity of material at my disposal has prevented fuller investigation in certain directions. In the event of another collection of like kind, I beg to recommend that officers be instructed to confine their samples to one particular essence or extract at a time, so that fuller justice may be done to it.

In the work recorded I have received very material help from Mr. Lemoine and Mr. Valin.

I have the honour to be, sir,
Your obedient servant,

A. McGILL.

COMMERCIAL EXTRACT OF LEMON.

Essence of Lemon.—The B. P. defines a tincture of lemon to be prepared from fresh lemon peel and alcohol of 90 per cent. The finished product would contain about 70 to 80 per cent alcohol by volume.

The U. S. P. defines an essence or spirit of lemon to be made from oil of lemon and lemon peel, macerated with alcohol of 95 per cent. The finished product would in this case contain a somewhat higher percentage of alcohol: probably from 80 to 90 per cent by volume.

Extract of lemon, as used for flavouring pastry, custards, &c., is a preparation which, so far as I know, has no legally defined composition. It is popularly supposed to be prepared like the pharmacopœal tinctures, by extracting lemon peel with alcohol, or by dissolving oil of lemon in alcohol.

Oil of lemon is the oil expressed from fresh lemon peel. It consists chiefly of hydrocarbons of the terpene series, but its characteristic flavour is due mainly to an aldehyde, or to a mixture of aldehydes, present to the extent of from 4 to 8 per cent. The principal aldehyde (citral) occurs in commerce under that name: and much of the lemon extract sold for flavouring purposes is made directly from citral. A very small quantity of citral suffices to give the lemon flavour and an economy of alcohol results from the substitution of citral for oil of lemon; this last requiring strong alcohol for its solution.

Commercial citral contains a trace of oil of lemons. A sample reported in the accompanying table contained 0·5 per cent, This minute amount of oil of lemon, accidentally present, cannot be held to make the use of citral equivalent to the use of oil of lemon in the manufacture of extract or essence of lemon. While the flavour of lemon is chiefly due to the citral which it contains, it is certain that other substances are involved in the total natural flavour, and these must, of course, be absent from a so-called extract made from citral. A German Imperial patent (No. 134,788)[1] recently granted to Heine & Co., prepares an artificial oil of lemon "by adding to a mixture of

92 parts of limonene and phellandrine, a mixture of citral, citronellal, geraniol, geranyl acetate, linalool and linalyl acetate, also 1 part of a mixture of nonylic and octylic aldehydes. The exact amount of the aldehydes depends upon the character and strength of the lemon odour desired.' I quote this formula in order to emphasize the fact that it is not alone to citral that lemon extract or essence owes its true flavour.

A recent decision in the Supreme Court of Michigan, rendered April 7, of this year, reversed a decision of a lower court, by which a so-called extract of lemon, made from citral, and artificially coloured, had been held to be adulterated. The manufacturers of terpeneless extracts claim better keeping qualities for such preparations, and less tendency to oxidize, thus developing disagreeable taste. It is also claimed that the full characteristic flavour of the lemon is conserved. Final opinion in this matter lies beyond the domain of the chemist, and an appeal must be made to the palate of the connoisseur. But it will be seen, from the accompanying tables, that whenever any considerable amount of oil of lemon is present at least 75 per cent of alcohol is present. This alcohol is the chief item of cost in manufacture, and it is reasonable to infer that the disuse of oil of lemon is at least in part accounted for by the possibility of employing weaker alcohol.

Most of the samples examined are coloured by coal-tar dyes—chiefly naphthol yellows and tropeolin. A normal extract of lemon has little or no colour, and it is regrettable that there should be a popular demand for lemon extract of a decided yellow. While I have no proof that these dyes, used in the minute amounts necessary to colour the extracts, are actually injurious to health, it has been clearly proven (Bulletin 83, p. 14) that they are poisons in considerable doses.

A. J. Winogradow [2] has demonstrated by recent experiments that so little as 1 millegramme (= 0.015 grain) of certain coal-tar dyes entirely prevents the digestion of egg albumen by pepsin.

[1] Pharmaceutical Review, 1903, p. 24.

[2] Zeitschrift, Untersuchung Nahr. u. Genussmittel 1903, 589–592.

II.—COMMERCIAL

ARRANGEMENT of Samples in order

Serial Number.	Name of Manufacturer.	Departmental number of samples.	Specific gravity of the sample, 15·5° C.	Specific gravity of the distillate to equal volume.	Per Cent *Alcohol by Volume. (Approximate).		Fixed residue at 100° C. Grammes per 100 CC.
					As alcohol	As proof spirit.	
1	Unknown	20237	0·8260		92·36	161·86	0·39
2	Schilling	23525	0·8273		91·96	161 16	0·50
3	Dyson, Gibson Co., 'White Star'	23505	0·8444		86·80	152·11	0·14
4	Davis & Lawrence	23363	0·8513		84·51	148·09	0·19
5	Dalley	17444 21720	0·8577		82·30	144·23	0·09
6	Dearborn	20236	0·8666		78·89	138·25	0·17
7	Black	20254	0·8758		75·53	132·36	0·06
8	Jones	21314	0·8758		75·53	132·36	0·08
9	Seely	21714 23153 17858	0·8974		66·94	117·32	0·91
10	Unknown	21694	0·9016		65·17	114·20	0·05
11	Simson Bros	4339	0·9097		61·53	107·84	0·13
12	Baird	17897	0·9186		57·64	101·02	0·13
13	Sherriff	17471	0·9380		48·21	84·49	0·08
14	McLaren	23115	0·9412		46·48	81·45	0·08
15	Robt. Greig Co	4321	0·9428		45·53	79·79	0·18
16	Dalley	23148	0·9598		34·69	60·79	
17	Mayell	17437	0·9608	0·9612	33·64	58·97	0·07
18	Hudon & Orsali	23574	0·9650		30·57	53·56	0·08
19	Unknown	21308	0·9663		29·40	51·53	0·07
20	Peebles	23436	0·9682		27·68	48·50	0·04
21	Unknown	23103	0·9685	0·9688	27·13	47·55	0·09
22	London Coffee and Spice Company	22043	0·9688		27·13	47·55	0·07
23	Dyson, Gibson Co., 'Jewel Ext.'	17466	0·9702		25·86	45·31	0·12
24	Eby Blain Co	21724	0·9712		24·88	43·69	0·07
25	Unknown	23431	0·9722	0·9721	23·88	41·85	0·06
26	Wright (Detroit)	23154	0·9751		21·09	36·95	0·04
27	Unknown	23432	0·9752		20·99	36·78	0·13
	Oil of lemon		0·8583				3·00
	Citral		0·8959				58·00

Owing to the very small amounts of solids in solution, I have considered that a sufficiently close

Ottawa, August 25, 1903.

EXTRACT OF LEMON.

of Specific Gravity (Density).

Reaction on pouring a few drops into water.	Rotation, 2 dm. tube. Degrees of sugar scale.	Equivalent volume per cent of lemon oil.	Wood-test for colouring matters. Dyes.	Reaction with dilute hydrochloric acid.	Remarks.
Turbid	− 15·1	4·7	Uncoloured	None	Genuine.
"	+ 49·5	15·5	"	"	Genuine, and of exceptionally high strength.
"	− 10·9	3·4	Yellow	Bleached	Contains 3·4 p.c. oil of lemons; is artificially coloured.
"	− 29·0	6·2	Uncoloured		Genuine, and above usual strength.
"	+ 11·1	3·5	Yellow	Bleached	Contains 3·5 per cent oil of lemons; is artificially coloured.
"	+ 7·0	2·2	"	"	Contains 2·2 per cent oil of lemons; is artificially coloured.
"	+ 1·5	0·5	Deep yellow	"	Contains 0·5 per cent oil of lemons; is artificially coloured.
"	+ 7·0	2·2	Orange	Reddish	Contains 2·2 per cent oil of lemons; is artificially coloured.
"	− 4·0	1·3	Deep yellow	Bleached	Contains 1·3 per cent oil of lemon; is artificially coloured.
"	+ 1·5	0·5	Uncoloured	None	Contains 0·5 per cent oil of lemons.
"	+ 1·4	0·4	"	" 0·4	"
"	+ 1·3	0·4	Deep yellow	Bleached	Contains 0·4 per cent oil of lemons; is artificially coloured.
Slightly turbid	+ 0·4	0·1	Yellow	Red	Contains a trace of oil of lemons; is artificially coloured.
"	− 0·4	0·1	"	No change	" " "
Clear	+ 0·2	0·1	"	Bleached	" " "
			Deep yellow	"	" " "
"	− 0·3	0·1	Yellow	"	" " "
"	+ 0·2	0·1	"	"	" " "
"	+ 0·3	0·1	Deep yellow	"	" " "
"	+ 0·2	0·1	Yellow	"	" " "
"	+ 0·3	0·1	"	"	" " "
"	+ 0·3	0·1	"	Red	" " "
"	+ 0·3	0·1	Deep yellow	No change	" " "
"	+ 0·2	0·1	Light yellow	Bleached	" " "
"	+ 0·3	0·1	"	Red	" " "
"	+ 0·0	0·0	Yellow	Bleached	Contains no oil of lemons; is artifically coloured.
"	+ 0·3	0·1	Deep yellow	"	Contains a trace oil of lemons; is artificially coloured.
	+322·0	100·0			
	+ 1·6	0·5			

approximation to the alcohol content was obtainable from the specific gravity of the sample.

Serial Number.	Name of Manufacturer.	Departmental Number.	Specific Gravity of the Sample.	Spirit Gravity.	Alcohol—by Volume.		Specific Gravity of de-alcoholized residue.
					Alcohol.	Proof Spirits.	
					p. c.	p. c.	
1	Black	20255	1·0465	0·9847	11·87	20·81	1·0603
2	Dalley	23149	1·0485	0·9746	21·59	37·83	1·0825
3	Dull	22661	0·9844	0·9781	18·14	31·80	1·0066
4	Gourlie	4326	0·9400	0·9337	50·47	88·44	1·0064
5	Huckels	23348	1·0058	0·9865	10·30	18·04	1·0190
6	Imperial Extract Co.	20309 22048	0·9985	0·9787	17·48	30·64	1·0070
7	Jonas	21307 21316	0·9919	0·9640	31·40	55·03	1·0300
8	Knight, John	4338	0·9718	0·9520	40·14	70·34	1·0219
	Laporte & Martin	21311	1·1060	0·9924	5·47	9·58	1·1115
10	London Coffee & Spice Co.	22045	1·0440	0·9811	15·21	26·66	1·0631
11	Mayell	23358	1·0470	0·9841	12·40	21·73	1·0719
12	McLaren	17857 22077 23548	0·9906	0·9648	30·73	53·86	1·0270
13	Peerless Extract Co.	23510	1·0164	0·9853	11·35	19·89	1·0312
14	Seely	17431 21718 22075 23152	1·0185	0·9741	22·09	38·71	1·0440
15	Tropical Extract Co.	20309 22048	1·0302	0·9865	10·30	18·04	1·0443
16	Toronto Coffee & Spice Co. (Silver Label).	17875	1·0169	0·9792	16·98	29·76	1·0377
17	" "	23344	1·0262	0·9857	11·00	19·27	1·0376
18	" "	22076	0·9932	0·9832	13·24	23·21	1·0107
19	" "	21312	0·9997	0·9844	12·13	21·27	1·0160
20	" "	21727	1·0344	0·9841	12·40	21·73	1·0484
21	" "	23104	1·0576	0·9768	19·49	34·14	1·0802

August 27, 1903.

Extract of Vanilla.

Polarimeter reading of residue in 2 dm. tubes. Corrected for Volume.	Cane-Sugar.	Vanillin. (Per 100 Volumes.)	Coumarin. (Per 100 Volumes.)	Sum of these. (Per 100 Volumes.)	Remarks.
	p. c.				
– 32·8	8·5	0·028	0·056	0·084	
– 52·5	13·7	0·080	0·036	0·116	
– 4·2	1·2	0·040	0·040	0·080	
– 3·0	0·8	0·044	0·060	0·104	Unusually high content in alcohol.
– 2·4	0·6	0·060	0·060	0·120	
– 3·6	0·9	0·048	0·040	0·088	
– 18·5	4·8	0·108	0·040	0·148	
– 19·2	5·0	0·032	0·016	0·048	Filtrate after clarifying with lead acetate is quite colourless. Unusually high content in alcohol.
96·0	25·0	0·012	0·144	0·156	Very low content of alcohol. Flavour chiefly due to coumarin.
– 51·6	13·4	0·076	0·024	0·100	
– 45·6	11·9	0·076	0·062	0·138	
– 18·5	4·8	0·048	0·036	0·084	
– 24·0	6·2	0·268	0·036	0·304	Contains a red dye of coal tar origin. Notably high content of vanillin.
26·1	6·8	0·080	0·028	0·108	
– 31·4	8·2	0·024	0·112	0·136	Flavour chiefly due to coumarin.
– 31·6	8·2	0·028	0·072	0·100	" "
– 2·4	0·6	0·040	0·092	0·132	" "
– 7·8	2·0	0·104	0·064	0·168	
– 6·0	1·6	0·036	0·032	0·068	
– 34·2	8·9	0·028	0·036	0·064	
– 43·8	11·4	0·028	0·160	0·188	" "

Commercial Extract of Vanilla.

This should be made from the dried fermented pod of *vanilla planifolia*, a plant which is cultivated in Mexico, Java and elsewhere. This fruit, as it comes into commerce, varies greatly in quality, the best coming from Mexico.

The flavour is chiefly due to a substance called *vanillin* (the aldehyde of methyl proto-catechuic acid) which occurs to the extent of from 1 to 2.75 per cent in the fruit.

Artificial *vanillin* is made on an industrial scale in Germany, and there is no doubt that much of the extract of vanilla of commerce is prepared directly from artificial vanillin. Regarding artificial vanillin, P. Carlos (1) 'Considers that, although synthetic vanillin may reproduce the odour of vanilla, it has not by any means the same delicacy of flavour; for flavouring chocolate and similar confectionery it is stated not to possess the same softness of flavour.'

Vanilla is not mentioned in the British Pharmacopœia. A tincture is defined in the U. S. P. to be made from vanilla, sugar and diluted alcohol. The finished tincture contains about 50 per cent (volume) of alcohol.

Coumarin is a substance having much the same flavour as vanillin, and is therefore capable of being substituted for this last in the manufacture of a *soi-disant* extract of vanilla. Coumarin (the anhydride of ortho-coumaric acid) occurs in the tonka-bean and in many other plants. It is also prepared artificially from salicylic aldehyde by several methods. However legitimate a substance, for use as a flavour, coumarin may be,—it is certainly to be considered as an adulterant when substituted for the more expensive vanillin, and sold under the name of vanilla.

Methods for the estimation of vanillin and coumarin in admixture have been worked out by several chemists. Those of Hess and Prescott, as modified by Winton and Silverman (1) have been employed in this laboratory.

Reference to the accompanying tables will show that coumarin is present, to some extent, in all the samples analysed, while in some of them it constitutes by far the greater portion of the aromatic ingredient of the extract.

The great range of variation in these extracts of vanilla is noteworthy. The following statement may make this point clearer:—

In 21 samples analysed—

Vanillin varies in amount from		0·012	to 0·268
Coumarin	" "	0·016	to 0·160
Alcohol	" "	5·47	to 50·47
Sugar	" "	0·6	to 25·0

It follows from this variability that most perplexing results to the consumer must be found when the article as made by one manufacturer is substituted for that made by another. It would be interesting to know what degree of constancy may be expected in the output of any single manufacturer. On account of the large amount of work in hand, and the small quantity of material furnished for analysis in many cases, I have considered it best to mix the different samples bearing the same maker's name, and work them as one sample. This has been done in the case of numbers 6, 7, 12, 14 and 15 of the accompanying table.

(1) Repertoire de Pharmacie, 14, 5—through Year Book of Pharmacy, 1902, 297.

(1) Journal American Chemical Society—Vol. 21, 256 and 721, and Vol. 24.

IV. Flavouring Essences.

Serial Number.	Departmental Number.	Name.	Name of Manufacturer.	Specific Gravity of Sample.	Fixed residue.	Alcohol (approximate). Volume per cent		Remarks.
					Per 100cc.	Alcohol.	Proof Spirit.	
1	4328	Almonds	Lymans Sons	0·9241	0·070	55·0	96·3	
2	17870	"	Seely	0·9131	0·050	59·9	105·0	
3	20258	"	Dearborn	0·9584	0·030	37·1	65·0	
4	20305	"	Jonas	0·9006	0·030	65·6	114·9	
5	21695	"	Fruit Canning Co	0·9357	0·170	49·5	86·7	Contains a yellow dye.
1	17914	Wintergreen	Baird Co	0·9164	0·100	58·6	102·7	
2	23105	"	Bradley & Son	0·9668	0·110	29·0	51·0	
3	23508	"	Langley & Henderson	0·8442	0·110	86·9	152·2	
1	21313	Cochineal	Constant	1·1478	30·460	None.		Polarization = −8°.
2	23115	"	Imperial Extract Co.	1·3024	87·160	"		" = +16°. Contains sugars and a foreign dye.
1	17893	Rose	Seely	0·9075	0·030	62·6	109·6	
2	20250	"	Simson Bros	0·9583	0·050	35·8	62·8	
1	23501	Apricot	Tufts & Son	0·9477	0·260	42·6	74·6	Contains a red dye.
1	17458	Banana	Pure Gold Co	0·9671	0·040	28·4	49·8	" yellow dye.
1	17902	Cinnamon	Jonas	0·8764	0·630	75·5	132·2	
2	21315	"	"	0·9202	0·920	57·0	100·0	
3	22066	"	Dalley Co	0·9405	0·110	47·0	82·6	" brown dye.
1	23375	Cloves	Davis, Lawrence Co.	0·8547	1·010	85·0	149·0	
1	17912	Pineapple	Pure Gold Co	0·9283	0·090	53·0	93·0	" yellow dye.
2	23147	"	Imperial Extract Co	0·9613	0·210	33·8	59·3	" red dye.
1	21696	Orange	Blue Ribbon	0·9538	0·060	39·0	68·0	" yellow dye.
2	23380	"	Hudon Hebert	0·9668	0·050	29·0	50·9	" "

Essence of Almonds.—The U. S. P. (1890) gives a formula for essence of bitter almonds which requires 75 per cent alcohol (volume) in the finished product which also contains 1 per cent of bitter almond oil.

Essence of Wintergreen, is not officinal in the B.P. The U.S.P. defines a spirit of wintergreen, made from dissolving 5 volumes of oil of gaultheria in 95 volumes alcohol (94 vol).

The U.S.P. distinguishes between natural and artificial oil of wintergreen directing the first to be prepared from the leaves of *Gaultheria procumbens* by distillation, while the latter is methyl salicylate. They are defined however, as being essentially the same.

Essence of Rose.—Rosae Oleum, Oil of Rose or Otto of Rose is defined in both B.P. and U.S.P. Rose water is made by distilling water from the flowers of Rosa Damascena. No essence of rose is mentioned.

Essences of Apricot and Banana.—No preparations from apricot or banana are mentioned in any pharmacopœia.

Cochineal.—Tincture of cochineal is defined by the B.P. to be made from cochineal (1 part) and alcohol of 45 p.c. strength (10 parts).

The essence or extract of cochineal is sold for giving colour to jellies, &c., and not like other extracts for flavouring purposes. So long as the colouring matter of cochineal is extracted and kept in solution in such a way that it shall not mould, the object of the manufacturer is served. A formula employing alum, cream of tartar, glycerine, alcohol and other ingredients is published in Part II of the U. S. Dispensatory, 17th Edn. It should be quite unnecessary to add a foreign colouring matter to cochineal.

Essence of Orange.—The B. P. defines a tincture of orange made from orange peel, with 90 per cent alcohol. The finished product would contain from 70 to 80 per cent alcohol.

The U. S. P. defines a spirit of orange made from oil of orange peel and alcohol of 95 per cent. The alcoholic strength would be about 10 per cent higher than in the former case.

The two samples examined show a much lower content than this.

Essence of Cinnamon.—The B. P. defines a spirit of cinnamon, containing 1 part of oil of cinnamon in 10 parts of the product; the solvent being 90 per cent alcohol.

Also, a tincture of cinnamon made from the bark, with 70 per cent spirit.

The U. S. P. *Spiritus Cinnamomi* is practically identical with that of the B. P. The tincture contains glycerine.

It does not follow that an essence prepared for the kitchen must come up to pharmacopœal standard.

Schimmel & Co. have recently taken out a patent for an artificial cinnamon oil.

Essence of Cloves.—The British Pharmacopœia defines an infusion of cloves; but neither essence nor tincture is defined in B. P. or U. S. P.

Pineapple Essence is not defined in any pharmacopœia.

V.—Essences of Peppermint.

Serial Number.	Departmental Number.	Manufacturer.	Specific Gravity of Sample.	Fixed Residue, per 100cc.	Rotation in 2 dm. tube, Sugar Scale.	Alcohol (approximate) Vol. per cent.		Remarks.
						Alcohol.	Proof Spirit.	
1	17884	Bennett Chem. Co..	0·8867	9·360	−3·2	74·5	130·6	
2	21688	Snowdrift Co.	0·9612	1·810	0·0	34·5	60·5	Contains a yellow dye.
3	22052	Gorman, Eckhart Co.	0·9622	0·190	0·0	33·1	57·9	" "
4	23359	Brayley Bros	0·9305	0·156	0·0	52·2	91·6	" "
5	23360	Davis, Lawrence Co.	0·9117	0·800	0·0	61·4	107·6	

Essence of Peppermint.

The B. P. defines a spirit of peppermint, made from oil of peppermint, to contain 10 per cent of this last, dissolved in 90 per cent alcohol. The resultant tincture would contain approximately 80 per cent of alcohol (volume).

The U. S. P. defines an essence containing 10 per cent oil of peppermint and 1 per cent of leaves, with alcohol of 94 per cent. The resultant tincture would much resemble the above.

It will be noted that only one of the samples analysed approximates to either of the pharmacopœal essences, and this is the only one showing presence of oil of peppermint by possessing optical activity. The oil of peppermint is lævo-gyratory, but appears to be very variable in the degree of rotation. A sample examined by me gave a reading −21·4° (sugar scale) in 2 dm. tube, on solution in alcohol to 10 volumes.

Owing to the presence of more or less sugar in the samples tabulated, the rotation observed cannot be taken as a safe guide to the oil present. The samples were too small to permit of fuller examination.

VI.—Flavouring Essences—Raspberry.

Serial Number.	Departmental Number.	Manufacturer.	Specific Gravity of Sample.	Fixed Residue, per 100cc.	Rotation in 2 dm. tube, Sugar Scale.	Alcohol (approximate) Vol. per cent.		Remarks.
						Alcohol.	Proof Spirit.	
1	17450	Pure Gold Co.	0·9811	10·460	+25·6	43·9	76·9	Contains about 6·7% sugar and a red dye.
2	20251	Jonas	0·9197	3·080	0·0	60·0	105·0	Contains a red dye.
3	21309	Laporte Martin....	0·9738	0·730	+1·8	25·0	44·0	" " and about 0·5% sugar.
4	23150	Dalley Co	0·9904	3·460	0·0	16·0	28·0	Contains a red dye.
5	23387	"	1·0573	20·140	+46·4	33·0	57·0	" " and about 12% sugar.
6	23435	"	0·9778	10·880	0·0	40·5	71·0	Contains a red dye.
7	23156	Imp. Ext. Co... .	1·0038	9·830	0·0	17·0	29·8	" "

Note.—These are all artificially coloured. There is no accepted standard for the article, and it is evident that while each manufacturer has his own formula, this formula shows great elasticity.

VII.—Flavouring Extracts—Strawberry.

Serial Number.	Departmental Number.	Manufacturer.	Specific Gravity of Sample.	Fixed Residue, per 100cc.	Rotation in 2 dm. Sugar Scale.	Alcohol (approximate) Vol. per cent.		Remarks.
						Alcohol.	Proof Spirit.	
1	17447	Whyte	0·9441	0·000	0·0	44·8	78·5	Contains a lavender dye.
2	17455	Blue Ribbon	0·9753	4·870	+16·0	35·0	61·4	" crimson " and about 4·2% sugar.
3	21310	Laporte Martin	0·9705	0·170	0·0	25·0	44·0	Contains a purple dye.
4	22055	Warren Bros.	0·9990	7·950	0·0	18·0	31·5	" red "
5	23151	Dalley Co	0·9845	4·160	0·0	26·0	45·5	" crimson "
6	23434	"	0·9820	0·930	+2·0	36·0	63·0	" purple " and about 0·5% sugar.

Note. These essences are all artificially coloured. There is no accepted standard for this article.

APPENDIX D.

BULLETIN No. 90--HONEY, 1903.

LABORATORY OF THE INLAND REVENUE DEPARTMENT,
OTTAWA, October 2, 1903.

W. J. GERALD, Esq.,
Deputy Minister of Inland Revenue.

SIR,—I beg to submit herewith a tabulated statement (No. 1) giving a description of the samples of honey which were collected according to your instructions of March 27 last, and which have been submitted to examination in this laboratory. Before referring to the particulars given in the table, it seems necessary to make the following explanatory remarks.

Honey is generally understood to be the sweet secretion which working bees produce from feeding on the nectar of the flowers, leaves, etc., of various plants and trees. As is well known, the aromatic constituents of many of these flowers are found in the honeys produced from them. Thus, in this country, clover, buckwheat and other honeys have been distinguished by their taste and aroma, while, on the continent of Europe, such names occur as linde, acacia, heath, conifer, forest and spruce honey. The nectar of flowers contains from 60 to 90 per cent of water, and both fruit sugar and cane sugar have been found in it. It experiences, in the stomach of the bee, certain changes which consist principally in an inversion of the cane-sugar. As is the case with many articles of food in Canada, 'the limits of variability' (see Section 19 of the Adulteration Act) permissible in honey have not yet been legally determined, but it seems to be generally accepted, not only by beekeepers but by the general public, that the feeding of bees in summer time with cane sugar or sugar solution, in order to increase the production, should be regarded as adulteration. This principle is expressly acted on by the association of Swiss Agricultural Chemists, who have also adopted 16 per cent cane sugar as the maximum limit which genuine honey ought to contain. Other chemists place the limit lower, and König states that natural honey may contain up to 8 or 10 per cent cane sugar. Experiments are on record which demonstrate that bees fed exclusively on cane sugar syrup produce a honey containing as much as 30 per cent cane sugar. Besides this adulteration, effected with the co-operation of the bees, honey may also be falsified by the direct addition of cane sugar or glucose (Starch sugar) syrup, the sophisticated honey in the latter case being sometimes sold as 'Swiss honey'. Neither of these varieties is difficult of detection, but it is otherwise in cases of an admixture of invert sugar, a substance produced by the action of dilute acids on cane sugar. This sort of adulteration has long been known, especially on the continent of Europe, where the product is sold under such names as 'Turkish honey', 'table honey' and 'prepared honey'. Not unfrequently it is more honestly termed 'sugar honey', or 'artificial honey,' (*Kunst honig*), and some of it is said to have come from America, in comb made from paraffine, and labelled as 'prime American honey.' Its manufacture has increased greatly during the last ten years. It is prepared with such skill as to baffle the efforts of German chemists to distinguish it from the genuine article, although both the German and the Belgian governments have sought by every means to protect the producers of pure honey. A recent memoir, emanating from the Imperial German Health Bureau, acknowledges that the trade in this artificial honey is very considerable, and that the addition of invert-sugar to genuine honey cannot be detected. (See *Zeitschrift für Untersuchung der Nahrungs- u. Genussmittel* for June 15, 1903.)

Whether it is likely that the last mentioned variety of spurious honey is sold in Canada, I am unable to state. I doubt whether invert-sugar is manufactured in Canada and certainly it is not imported under that name. There is, however, a considerable importation of honey itself, which is given in the Trade and Navigation Tables as follows:—

	Entered for Home Consumption for Fiscal Year ended June 30, 1902.	June 30, 1903.
Honey in the comb, or otherwise, and imitations thereof—	Lbs.	Lbs.
From Great Britain	31,856	6,209
" British West Indies	18,754	
" Austro-Hungary	6,571	51,789
" China	320	
" Germany	3,559	
" United States	85,451	62,606
Total	146,511	120,604

It would seem quite possible that some of this imported honey, upon which a duty of 3 cents per lb. has to be paid, may be of a spurious character.

The adulteration of honey by means of added water has also to be taken into consideration. The quantity in genuine honey seldom exceeds 20 per cent, and the maximum limit is not placed beyond 25 per cent by those chemists who have studied the subject.

In Table I will be found all the information, as well as analytical results, which is available regarding 99 samples of honey, which were collected in the open market and subjected to examination here. Besides the vendor's name and address, and those of the party from whom he is said to have procured the honey, there are given in a few cases designations indicating quality. Under the results of examination are given the direct saccharimeter reading, and the water percentage as the best discriminating tests for separating the apparently genuine from the apparently adulterated samples.

The direct saccharimeter reading of the 99 samples was observed in the same manner as in testing samples of cane sugar or molasses, by means of the Schmidt & Haensch improved instrument with triple field of vision. The number of degrees mentioned are therefore from observation of a 26.048 per cent solution in a 200 mm. tube. It will be observed that the great majority of the samples, 86 in number, give the levo-rotatory readings, said to be indicative of pure honey when an admixture of invert-sugar is excluded from consideration. It must not, however, be supposed that left hand rotation, even in the absence of invert-sugar will infallibly indicate a genuine honey. It is quite possible that honey, adulterated with a small proportion of glucose syrup, may still give a distinct levo-rotatory reading. An experiment on this point, made by Mr. McGill, may here be put on record. 93 parts of honey reading $-16\cdot2°$ at 20° C. were mixed with 7 parts of ordinary glucose, reading $+88°$ at 30° C. This adulterated honey read (after boiling and cooling the solution to correct bi-rotation) $-4\cdot3°$ at 20° C. The most of the samples, 69 in number, showed crystallization, while in 17 there was no such appearance. In this separation of the sugars, dextrose or grape sugar preponderates over the levulose or fruit sugar. These sugars are present in the honey itself in somewhat different proportions from those contained in invert-sugar, the levulose prevailing to a slight extent. Since 'it is held by experienced beekeepers that all genuine honey will eventually crystallize, and hence that honey warranted to remain syrupy is probably adulterated' (Allen), it is quite possible that some of these clear honeys may have contained an addition of invert-sugar. No less than 13 samples showed positive rotation, and, as probably adulterated samples, were subjected to further examination, the details of which are given in a separate table, No. II. The final conclusions arrived at regarding the adulteration of these are however incorporated in Table I, while the more technical explanations regarding the methods of examination are given in a memorandum appended to Table II.

The percentage of water stated in Table I was obtained by evaporating 10 ccm of a 5 p.c. solution of the sample in crysotile fibre for 24 hours at a temperature varying from 60° to 70° Centigrade, but never exceeding the latter figure. Only 8 of the samples were found to contain moisture to the extent of 25 p.c. and over, namely:—

No. 17887	with 27.4 p.c.	and	–	reading;	clear.
" 17896	" 25.6 "		"	"	"
" 21300	" 25.0 "		"	"	"
" 21301	" 32.6 "		"	"	cryst.
" 21305	" 28.8 "	and	+	reading;	clear.
" 23101	" 26.4 "		"	"	"
" 17464	" 25.6 "	and	–	reading;	cryst.
" 17467	" 27.4 "	and	+	reading;	clear.

Significantly enough, three of these belong to the samples showing right-handed polarization and classed as adulterated. Other three belong to the class showing left-handed polarization, but suspected of adulteration with invert-sugar on account of their clearness. The remaining two gave minus readings and crystallization and are the only ones which may fairly be suspected of containing added or, at any rate, too much water.

It will be observed that some of the adulterated samples contained fragments of comb floating in the honey, which had to be separated previous to examination. This is, of course, a very different thing from honey in the comb. Most likely the general consumer might avoid adulterated honey by purchasing it in the comb and carrying out himself the process of extracting the honey.

According to the conclusions stated in Table I, the following classification may be made of the samples described in it:—

Genuine	81
Doubtful	5
Adulterated	2
Adulterated with glucose syrup	6
Adulterated with cane sugar	5
Total number of samples	99

I have the honour to be, sir,
your obedient servant,

THOMAS MACFARLANE,
Chief Analyst.

RESULTS of Analysis of 99 Samples

Date of Collection.	Number of Sample.	Name and Address of Vendor	Name and Address of Manufacturer or Furnisher as given by Vendor or on the Label.	Quantity Collected.	Cost.	Brand or Description.
1903.		*District of Halifax.*			$ cts.	
April 16	20240	R. F. Guest, Yarmouth	Parker & Eakins, Yarmouth	3 bottles	0 30	
" 20	20263	R. B. Dakin, Windsor, N.S.	Brown & Webb, Halifax	3 "	0 20	
" 21	20264	H. E. Wilson, Windsor	Hattie & Mylius "	3 "	0 20	
" 28	20312	G. A. Burbridge, Halifax	Brown & Webb "	3 "	0 30	
" 28	20313	Hattie & Mylius "	Vendors	3 "	0 45	
" 30	20322	R. McFatridge "	Hattie & Mylius, Halifax	3 "	0 45	'Fine New Honey.'
" 30	20325	W. H. Stevens, Dartmouth	" "	3 "	0 30	
" 30	20328	E. Butcher "	Brown & Webb "	3 "	0 45	
May 1	20330	G. H. Caldwell, Halifax	" "	3 "	0 40	
" 1	20333	Brown Bros. & Co. "	" "	3 "	0 45	
April 17	4317	G. E. Hughes, Charlottetown.	" "	3 "	0 45	
" 17	4318	H. A. Ellis, Charlottetown	John Newson, Charlottetown.	3 "	0 38	
" 17	4327	G. A. Gourlie, Summerside	Henry Watson & Co	3 "	0 45	
" 17	4334	D. Gordon, Georgetown	Evans & Son, Montreal	3 "	0 45	
" 17	4340	A. McLean "	Dearborn & Co.	3 "	0 60	
		District of New Brunswick.				
" 9	17854	Puddington & Merritt, 55 Charlotte St., St. John	E. L. Colpitt & Co., Petitcodiac, Pleasant Vale, Albert Co., N.B.	3 "	0 75	'Maple Leaf'.
" 11	17856	G. M. & A. A. Barker, 100 Princess St., St. John.	R. H. Smith, St. Thomas.	3 "	0 45	'Ontario Honey.
" 14	17867	Geo. A. Moore, 109 Brussel St., St. John.	Bottled by vendor from honey in bulk.	3 "	0 60	
" 17	17885	Francis McKay, 228 Main St., Moncton.	F. W. Fearman, Hamilton	3 "	0 45	'Clover Honey
" 17	17886	Dr. E. O. Steves, 301 Main St., Moncton.	Canadian Drug Co., St. John.	3 "	0 45	
" 17	17887	Geo. Spencer, 272 Main St., Moncton.	" "	3 "	0 35	'White Clover Honey.'
" 17	17888	J. McD. Cook, 195 Main St., Moncton.	W. D. Black, Cloverdale Apiary. Truro, N.S.	3 "	0 75	'Extracted Clover Honey'
" 21	17896	Fred Waterson, 4 King St., St. Stephen.	Canadian Drug Co., St. John.	3 "	0 60	'Clover Honey
" 22	17904	" "	G. F. Beach, Charlotte Co., N.B.	3 "	0 60	
" 25	17916	W. A. Eastbrook, York St., Fredericton.	B. A. Goodspeed, York Co., N.B.	3 "	0 75	
		District of Quebec.				
" 16	23339	C. Peloquin, Notre Dame de St. Hyacinthe.	Vendor	3 lbs	0 30	

of Honey as sold in 1903.

Results of Examination.			Observer.	Remarks by the Chief Analyst.	Number of Sample.
Direct Saccharimeter Reading.	Water.	Physical Characters.			
	p. c.				
— 9·0	24·6	Light yellow syrup, clear with pleasant smell.	Miss S. E. Wright.	Genuine	20240
— 7·3	24·0	Thick; strong beeswax smell, crystallised throughout.	"	"	20263
— 7·8	24·4	Clear syrup with sediment, strong beeswax smell.	"	"	20264
—32·2	17·0	Thick; crystallised throughout, strong beeswax smell.	"	"	20312
— 2·3	22·2	Deep yellow syrup, clear; beeswax smell; mild taste.	"	"	20313
—10·7	18·8	Deep yellow colour; clear; mild flavour.	"	"	20322
— 7·9	14·0	Somewhat thick; slightly smoky odour.	"	"	20325
—10·2	22·6	Yellow colour; one-half clear; the other crystallised; mild taste; beeswax odour.	"	"	20328
—10·7	19·2	Thick crystallised syrup; mild taste.	"	"	20330
—14·2	18·4	" " "	"	"	20333
—14·3	18·2	Light yellow colour; crystallised throughout.	Miss E. Davidson	"	4317
— 9·0	18·0	Yellow; slightly crystallised ..	"	"	4318
—15·7	18·8	Light yellow; crystallized throughout.	"	"	4327
—15·4	23·8	Yellow; slightly granulated or crystallised.	"	"	4334
+26·4	22·4	Yellow; partly crystallised ...	"	Adulterated by addition glucose syrup.	4340
—16·9	22·0	Brown; partly granulated.....	"	Genuine.....	17854
15·0	19·4	Yellow; granulated throughout.	"	"	17856
— 9·0	20·6	" clear	"	"	17867
—17·0	21·6	" partly granulated	"	"	17885
—18·3	18·2	" "	"	"	17886
—15·7	27·4	Light yellow; clear; pleasant taste.	Miss S. E. Wright.	Doubtful..	17887
10·4	25·4	Light yellow; deposit on bottom and sides of jar; mild.	"	Genuine	17888
—13·3	25·6	Pale yellow; thick; very mild taste.	"	Doubtful..	17896
—15·8	24·6	Light yellow colour; deposit on bottom; strong beeswax smell; mild taste.	"	Genuine.	17904
—15·6	23·2	Yellow; slight froth on top; strong beeswax smell; mild taste.	"	"	17916
— 8·7	18·2	Bright yellow colour; clear; flower-like flavour.	"	"	23379

RESULTS of Analysis of 99 Samples

Date of Collection.	Number of Sample.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher as given by Vendor or on the Label.	Quantity Collected.	Cost.	Brand or Description.
1903.		*District of Quebec*—Con.			cts.	
April 22	23362	W. Campbell, St. Hyacinthe	W. Myers, White's Station	3 lbs.	0 30	
" 28	23372	L. S. Plamondon, South Durham.	Jos. Bissonnet, Valcourt	2½ "	0 30	
" 29	23378	O. Carigan et fils, Three Rivers, Que.	Le Rochefort, Bécancourt.	3¼ "	0 39	
May 1	23388	S. Jacques et fils, Terrebonne.	From farmer of Lachinail.	5 "	0 60	
April 30	23381	E. Goudron, Berthierville,	Vendor.	3 "	0 30	White
" 30	23382	" "	"	3 "	0 30	Brown.
May 7	23391	Simeon Papillau, Notre Dame de St. Hyacinthe.	Antoine Marcil, Notre Dame de St. Hyacinthe.	2 5/16 "	0 23	
" 15	23604	J. B. St. Pierre, St. Hyacinthe.	Sœurs du Precieux Sang, St. Hyacinthe.	4½ "	0 65	
" 15	23605	J. B. Daignault & Cie, St. Hyacinthe.	C. Peloquin, Notre Dame de St. Hyacinthe.	3 "	0 30	
		District of Montreal.				
May 5	21296	H. Poirier, 1978 St. Catherine St., Montreal.		1 lb.	0 12	
" 5	21297	P. Daoust, 1830 St. Catherine St., Montreal.	Gunn, Langlois & Co	1 "	0 12	
" 5	21298	A. Fournier, 1879 St. Catherine St., Montreal.		1 "	0 12	
" 5	21299	G. De LaMothe, 1502 St. Catherine St. Montreal.		1 "	0 12	
" 5	21300	P. Massicotte & Co., 1470 St. Catherine St., Mont'l.	John Miller, Montreal.	2 jars	0 20	
" 8	21301	E. Limoyer, 1949 Notre Dame St., Montreal.		1 lb.	0 13	
" 11	21302	L. P. Lavoie, 3187 Notre Dame St., St. Cunég'de.	Hudon & Orsali, Montreal.	1 "	0 10	
" 11	21303	Robert & Frères, 229 Richelieu St., St. Cunégonde.		1 "	0 12	
" 14	21304	L. Legault, 102 Coursol St. St. Cunégonde.	L. P. Lavoie, St. Henri.	1 "	0 10	
" 14	21305	W. J. Maloney, 468 St. Antoine St., St. Cunégonde.	Montreal Canning and Preserving Co.	3 jars	0 30	'Fine Honey Compound,' 'Banner Brand.'
		District of Kingston.				
April 30	23137	S. Fourt, Walton St., Port Hope.		1 bottle	0 20	
" 30	23139	D. F. McDonald, Pitt St., Cornwall.	W. Atchison, Cornwall	1½ lb.	0 27	
" 30	23140	W. A. Dunkin, Cornwall.	R. Atchison "	1 "	0 15	
" 30	23141	D. J. Gillies "	J. McNaughton, St. Raphaels.	1 "	0 10	
" 30	23142	" "	C. C. Farran, Farran's Pt.	3 jars	0 40	
" 30	23143	R. Nichols "		3 "	0 30	
" 30	23144	G. W. Armstrong "		1 lb.	0 11	
" 30	23145	J. E. Chevrier "		1 "	0 12	
" 30	23146	G. W. Runion, Marlboro' St., Cornwall.		1 "	0 10	
" 30	23138	J. Maybury & Co., Prescott.	Mrs. Robt. Johnson.			

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of Honey as sold in 1903—*Continued.*

Results of Examination.			Observer.	Remarks by the Chief Analyst.	Number of Sample.
Direct Saccharimeter Reading.	Water.	Physical Characters.			
	p. c.				
—13·7	23·4	Brownish yellow; seven-eighths of the bulk is granulated; smoky smell and taste.	Miss S. E. Wright	Genuine	23362
— 6·2	22·8	Yellow; clear; very strong beeswax smell.	"	"	23372
—12·2	22·6	Brown; clear; buckwheat taste and smell.	"	"	23378
—11·5	22·6	Light yellow syrup; thick; strong beeswax smell; mild taste.	"	"	23388
—12·5	20·0	Light brown colour; partly crystallised.	Miss E. Davidson.	"	23381
—16·6	17·8	Brown; crystallised throughout; buckwheat taste.	"	"	23382
—15·7	19·2	Light yellow; crystallised throughout; smoky smell.	"	"	23391
— 5·8	19·0	Light yellow; crystallised throughout.	"	"	23604
—16·0	19·2	Yellow; crystallised almost throughout.	"	"	23605
—14·3	20·0	Light yellow colour; crystallised throughout.	Miss E. Davidson.	Genuine	21296
—16·5	19·2	Light yellow colour; crystallised throughout.	"	"	21297
—15·5	19·2	Yellow; crystallised throughout; slight odour of smoke.	"	"	21298
—16·7	20·0	Light yellow; almost entirely crystallised.	"	"	21299
16·6	25·0	Light yellow, clear; very sweet taste.	"	Doubtful	21300
— 6·0	32·6	Brown; partly crystallised; tastes of buckwheat.	"	Contains too much water.	21301
—15·8	21·0	Light yellow; crystallised throughout.	"	Genuine	21302
—18·5	20·8	Dark brown; crystallised; smells and tastes of buckwheat.	"	"	21303
—13·8	24·4	Dark brown; deposit at bottom; smells and tastes of beeswax	Miss S. E. Wright.	"	21304
—83·0	28·8	Clear thin syrup; mild odour and not much taste of honey.	"	Adulterated by addition of glucose syrup.	21305
— 8·9	18·4	Pale yellow; granulated; flower-like flavour.	Miss S. E. Wright.	Genuine	23137
—11·1	14·6	Light yellow; granulated; pleasant taste and smell.	"	"	23139
—13·9	20·6	Light yellow; granulated; mild flavour.	"	"	23140
—15·1	19·2	" " " "	"	"	23141
—14·2	19·0	Yellow; clear; mild taste & smell.	"	"	23142
— 8·8	20·0	" granulated.	"	"	23143
— 7·9	23·8	Pale yellow; thick syrup; mild taste.	"	"	23144
—17·5	20·0	Yellow; partly crystallised.....	Miss E. Davidson.	"	23145
—13·9	19·0	" crystallised throughout.	"	"	23146
—11·2	24·2	" strong smell and taste of beeswax.	Miss S. E. Wright.	"	23138

RESULTS of Analysis of 99 Samples

Date of Collection.	Number of Sample.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher as given by Vendor or on the Label.	Quantity Collected.	Cost.	Brand or Description.
1903.		*District of Toronto.*			$ cts.	
April 15	23401	Chas. Chown, 575 Yonge St., Toronto.	Jones Bros., Niagara, Ont.	3 jars	0 27	
" 15	23402	R. English, 490 Yonge St., Toronto.		3 "	0 25	
" 15	23403	F. Patience, 429 Yonge St., Toronto.	T. J. Dougall, Stouffville, Ont.	1 lb.	0 15	
" 16	23404	J. M. Bothwell, Dunlop St. Barrie.	J. Gough, Crown Hill	1 "	0 10	
" 16	23405	James Vair, Dunlop St., Barrie.		1 "	0 10	
" 16	23406	Hobley Bros., Dunlop St., Barrie.	W. J. Gough, Crown Hill	1 "	0 13	
" 18	23102	J. T. Petrie, St. Paul St., St. Catharines.	H. Freas, St. Annes	1 jar	0 40	
" 18	23101	J. T. Petrie, St. Paul St., St. Catharines.	Upton Co., Hamilton	3 jars	0 30	
" 17	23407	John O. Carpenter, M'ket Square, Hamilton.		1 lb.	0 20	
" 17	23408	C. H. Peebles, Market Square, Hamilton.		1 "	0 15	
		District of Windsor.				
April 9	22047	C. A. Nairn, Goderich	Mrs. Strachan, Goderich	3 jars	0 40	
" 16	22065	Stuebing Bros., Berlin	F. F. Dalley & Co., Hamilton.	3 "	0 30	
" 16	22069	A. K. Roesch, Waterloo	F. W. Fearman, Hamilton.	1 lb.	0 25	
" 17	22074	John Sloan & Co., Galt	Mrs. Rose Miller	3 jars	0 35	
" 18	22080	J. A. McRae, Guelph.	H. Walker & Sons, Guelph.	3 "	0 30	
" 22	22087	Wm. Anderson, Chatham.	Mr. Chrysler	3 lbs.	0 35	
" 22	22088	Hugh Malcomson "	Amos Kelly, Co. Kent, Ont.	3 "	0 35	
" 22	22091	Geo. Parrot, Glencoe.	Wall & Guffy, Windsor	3 pots	0 30	
" 22	22097	James Wilson, London	E. Bainard, Glenworth.	3 "	0 35	
" 22	22098	A. P. Yeo, London.	Vendor	3 "	0 30	
		District of Winnipeg.				
April 15	17430	Jas. Freeborn & Co., Morden.	Dundas & Flavelle, Lindsay, Ont.	1 lb.	0 60	
" 18	17438	J. A. Munro, Boissevain.	Deadmaris, Brussels, Ont.		0 75	
" 23	17448	R. W. McNaughton, Moosomin.	H. H. Waddell, St. Thomas, Ont.	3 jars.	1 05	
" 24	17449	A. Grant, Brandon	From a farmer	3 "	1 05	
" 25	17459	J. & E. Brown, Portage la Prairie.	Bright & Johnson, Winnipeg	3 "	0 75	
May 6	17464	W. B. Francis, Winnipeg.	Dyson, Gibson Co., Winnipeg.	3 "	0 60	
" 6	17467	J. G. Hargrave "	Upton, Hamilton.	3 "	0 75	
" 7	17469	Porter & Orris "	Dundas & Flavelle, Lindsay, Ont.	3 "	0 60	
" 7	17472	Campbell Bros. & Wilson, Winnipeg.	Vendors	3 "	0 60	

of Honey as sold in 1903—*Continued.*

Results of Examination.			Observer.	Remarks by the Chief Analyst.	Number of Sample.
Direct Saccharimeter Reading.	Water.	Physical Characters.			
	p. c.				
15·9	21·4	Yellow; partly crystallised.....	Miss E. Davidson.	Genuine.....	23401
—17·7	22·8	Light yellow, crystallised almost throughout.	"	"	23402
15·7	19·0	White; crystallised throughout and almost solid.	"	"	23403
— 7·4	18·4	Yellow; slightly crystallised.. ..	"	"	23404
— 1·9	22·2	Yellow; partly crystallised.....	"	"	23405
—10·1	21·0	Light yellow; crystallised throughout.	"	"	23406
—16·2	21·6	White; crystallised throughout..	"	"	23102
—70·8	26·4	Yellow; clear.	"	Adulterated by addition of glucose syrup and cane sugar.	23101
—11·4	22·4	White; crystallised throughout..	"	Genuine.....	23407
—14·2	20·6	" " " ..	"	"	23408
—19·2	21·6	Yellow; partly crystallised.....	Miss E. Davidson.	Genuine	22047
—17·0	20·8	" crystallised throughout.	"	"	22065
— 7·0	19·2	" clear	"	"	22069
—14·1	21·4	" partly crystallised.....	"	"	22074
—20·0	21·2	" " "	"	"	22080
—13·5	19·4	Light yellow; crystallised throughout.	"	"	22087
—13·0	18·8	Yellow; partly crystallised... .	"	"	22088
—12·0	19·8	" " "	"	"	22091
—14·8	21·4	Light yellow; crystallised throughout.	"	"	22097
— 9·1	20·2	Yellow; crystallised throughout.	"	"	22098
—14·5	21·2	Yellow; partly crystallised.....	Miss E. Davidson.	Genuine.....	17430
—23·0	23·2	Dark yellow; clear	"	Adulterated by addition of cane sugar.	17438
—15·3	19·2	Yellow; crystallised throughout.	"	Genuine.....	17448
— 7·4	19·2	White; crystallised throughout..	"	"	17449
—19·0	23·0	Brown; clear; smells of buckwheat.	"	Adulterated by cane sugar	17459
—11·6	25·6	Yellow; partly crystallised.....	"	Contains too much water.	17464
+49·1	27·4	Dark yellow; clear.....	"	Adulterated by addition of glucose syrup.	17467
—14·5	20·2	White; crystallised throughout..	"	Genuine	17469
—26·4	16·4	Brown; clear; very thick.....	"	Adulterated by addition of cane sugar.	17472

RESULTS of Analysis of 99 Samples

Date of Collection.	Number of Sample.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher or given by Vendor or on the Label.	Quantity Collected.	Cost.	Brand or Description.
1903.		*District of Manitoba.*			$ cts.	
April 21	21711	Ouimette & Wallever, Red Deer.	J. Turner & Co., Hamilton	3 jars.	0 75	
" 23	21715	John West, Wetaskiwin..	" "	3 "	0 60	
" 24	21719	J. H. Morris & Co., Edmonton.	Dyson, Gibson Co., Winnipeg.	3 "	0 60	
" 25	21726	A. Davies, Strathcona....	" "	3 "	0 75	
" 29	21729	A. W. Ward, Calgary....	" "	3 "	0 60	
		District of British Columbia				
April 16	21686	A. T. Charleton, Port Haney.	Geo. Charleton, Ailsa Craig, Ont.	2 "	0 40	
" 16	21690	Coulter & Berry, Langley.	H. L. Johnson, Chilliwack	3 "	0 75	
" 16	21699	H. C. Henderson, Chilliwack.	A. Malcomson, Chilliwack.	3 "	0 75	
" 16	23503	Mrs. E. A. Farrer, Chilliwack.	G. A. Kipp, Chilliwack....	3 "	0 75	
" 21	23516	S. Petersky, Steveston....		3 "	0 90	
" 21	23520	E. Hunt, Steveston.....	San Diego Honey Co., San Francisco.	3 "	0 90	
" 21	23522	W. C. McBride, Port Guichon.	Pacific Const. Syrup Co., San Francisco.	3 "	1 00	
" 21	23523	Marshall Smith, Ladner's Landing.	Schilling Co., San Francisco	3 "	0 90	
" 25	23542	Speed Bros., Victoria.....	J. Reagh, Ladners's Landing.	3 "	0 75	
" 28	23549	E. J. Rae, New Westminster.	W. Ross, Ontario Co., California.	3 "	0 75	

of Honey as sold in 1903—*Concluded*

Results of Examination.			Observer.	Remarks by the Chief Analyst.	Number of Sample.
Direct Saccharimeter Reading.	Water.	Physical Characters.			
	p. c.				
−14·5	16·8	White; crystallised throughout.	Miss E. Davidson.	Genuine	21711
−11·0	18·8	White; crystallised almost throughout.	"	"	21715
−12·4	23·2	Yellow; partly crystallised	"	"	21719
+ 7·1	25·2	Yellow; clear	"	Adulterated by cane sugar	21726
+ 3·5	26·2	" "	"	" "	21729
−17·4	16·6	White; crystallised throughout	"	Genuine	21686
− 8·4	22·8	Yellow; partly crystallised; contains pieces of comb.	"	"	21690
+14·2	18·8	Brown; partly crystallised; very thick; tastes and smells of brown sugar.	"	Adulterated	21699
− 8·2	19·0	Dark yellow or brown; crystallised almost throughout; contains pieces of comb.	"	Genuine	23503
+69·8	21·6	Yellow; partly crystallised; contains pieces of comb.	"	Adulterated with glucose syrup.	23516
+41·6	21·2	" " "	"	" "	23520
−42·8	21·0	Yellow; slightly crystallised; contains pieces of comb.	"	"	23522
−14·8	17·0	White; crystallised throughout.	"	Genuine	23523
−10·7	17·9	Yellow; partly crystallised	"	"	23543
−16·8	15·0	Brown; not crystallised; very thick.	"	"	23549

TABLE II.—Results of further examination of 13 samples Honey showing right handed rotation, by Miss. E. Davidson.

No. of samples.	By CLERGET PROCESS.				Approximate percentage of glucose syrup.	By FEHLING SOLUTION.			Dextrine reaction.
	Direct Saccharimeter reading.	Reading after Inversion.	Temperature Centigrade.	Cane sugar by Clerget formula; p. cent.		Reducing sugar, stated as invert.	Reducing sugar after inversion.	Cane sugar, per cent.	
4340	+27·4	+21·3	23	4·65	13·7	62·68	68·04	5·09	Distinct.
21305	+81·0	+71·3	24	7·42	40·5	49·48	54·24	4·52	"
23101	+70·7	+39·3	24	24·02	35·3	40·15	62·60	21·33	"
17438	+22·9	−17·9	24	31·22	.....	42·98	80·08	35·26	None.
17459	+19·2	−16·5	24	27·31	.....	47·15	76·80	28·16	"
17467	+48·6	+35·2	24	10·24	24·3	52·98	63·00	9·52	Distinct.
17472	+26·8	−16·4	24	33·05	.....	45·69	78·75	31·41	None.
21726	−8·5	−15·2	24	18·13	.....	52·49	75·00	21.38	"
21729	+3·9	−14·7	23	14·18	.....	55·60	75·04	18·46	"
21699	−14·1	+10·8	21	2·49	.....	65·13	68·63	3·32	"
23516	+70·1	+55·4	23	11·20	35·0	55·51	65·72	9·70	Distinct.
23520	+41·9	+35·4	23	4·96	20·9	63·38	69·22	5·54	"
23522	+43·5	+32·2	23	8·61	21·7	62·60	70·00	7·11	"

MEMORANDUM REGARDING THE EXAMINATIONS REFERRED TO IN TABLE II.

The samples whose numbers are given in this table are those which shewed right handed rotation in the polariscopic observation noted in Table I, and which were subjected to further examination in order to ascertain whether this behavior was due to glucose syrup or cane sugar, and, in the latter case to determine the quantity of cane sugar present.

They were first examined by the Clerget process the nature of which is very clearly described by Allen (Commercial Organic Analysis, 1898; Vol. I, p. 260). The only difference which has been made in the equations there given is in the change by inversion which instead of 144 has been placed at 142·7 in accordance with the more recent determinations of Wohl. In Table II all the observations were given which are necessary for calculating the cane sugar, the percentage of which is also stated.

The percentage of sucrose present in the samples of Table II was also ascertained by the use of Fehling solution, the details of the process being as follows :—A five per cent solution of the honey sample was first prepared.

(1.) For determining the reducing sugars 10 c.c.m. of it, containing 0·5 grammes of the original sample were treated direct with Fehling solution in excess. The weight of the cuprous oxide produced multiplied by the factor 0·4861 and by 200 gave the percentage of reducing sugars present, stated as invert sugar. The name reducing sugar applies to all the varieties of this substance which act upon Fehling solution with precipitation of cuprous oxide. Dextrose, grape sugar, starch sugar, levulose or fruit sugar, the mixture of dextrose and levulose called invert sugar, and certain reducing substances which form in the syrup during the manufacture of sugar from the cane are all included under "reducing sugars." The term excludes cane sugar which does not act upon Fehl-

ing solution previous to inversion. The factor 0·4861 is based upon work done by Mr. F. W. Babington (Analyst, Vol. xvi., p. 181) and represents the cuprous oxide yielded by 1 gramme of invert sugar derived from inverting by dilute acid 0·95 grammes of cane sugar and precipitating by Fehling solution.

(2.) For ascertaining the quantity of cane sugar present 50 ccm. of the above mentioned five per cent solution of the honey were inverted by the action of 2 ccm. hydrochloric acid, then rendered slightly alkaline by potash solution and made up to 100 ccm. 10 ccm. of this inverted solution, containing 0·25 grammes of the original sample were then treated with excess of Fehling solution. The cuprous oxide produced multiplied by 400 and the factor 0·4861 gave the percentage of reducing sugar, including that derived from the inversion of the cane sugar present. The direct percentage, as ascertained under (1) was then deducted from the percentage after inversion, and the difference multiplied by 0·95 which gave the percentage of cane sugar in the sample. It will be seen from the table that the percentages thus obtained confirm, on the whole, with sufficient accuracy, those obtained by the Clerget process.

Allen states that, in the absence of added cane and invert sugar, an approximate estimation of the proportion of glucose syrup in honey may be made by reckoning 1 per cent of the adulterant for every degree of dextro-rotatory power possessed by the sample. Following this rule the percentage of glucose syrup present in the 13 samples of Table II are given in one of its columns.

The samples in question were also subjected to a qualitative test for dextrine which is usually a constituent of commercial glucose syrup. This test was applied in the manner described by Haenle (Die Chemie des Honigs : Strasburg, 1892), 5 ccm. of a 33⅓ per cent solution of the sample are placed in a test tube, and 2 ccm. of absolute alcohol gently added. If dextrine is present a white turbidity is observable at the contact plane of the two fluids, which is caused by the separation of the dextrine, and disappears on mixing. Cane sugar treated in this way, and honey as a rule do not give this reaction. In Table II a column is given which shows the results of this test when applied to the different samples.

T. M.

APPENDIX E.

BULLETIN No. 91--WHITE LEAD IN OIL, 1903.

OTTAWA, Nov. 4, 1903.

W. J. GERALD, Esq.,
Deputy Minister of Inland Revenue.

SIR,—I beg to present this report regarding 147 samples of white lead in oil which, in accordance with your instructions of August 11 last, were collected in the various districts of the Dominion as follows :—

	Number of Samples.
Nova Scotia and P. E. Island	24
New Brunswick	16
Quebec	18
Montreal	15
Kingston	14
Toronto	16
London	14
Manitoba and North-west	18
British Columbia	12
Total	147

The table appended to this report gives the names under which these samples were sold, and the results of their examination in this laboratory, as well as the names of the vendors and furnishers of the samples. Besides ascertaining the absence of 'barytes,' the commercial name of the mineral, barite, finely ground, or its percentage when present, search was made for acid-soluble sulphuric acid and lime, in order to detect adulteration by sulphate of lime or by common whiting. These, it will be observed, were very seldom found, the chief adulterant being barytes. The table also gives in the remark column the conclusions drawn by myself from the results of the testing, according to which the total number of samples examined may be classified as follows :—

Genuine	100
Slightly impure	2
Adulterated, but not sold as pure	2
Adulterated, but sold under special names	25
Adulterated, sold as white lead	12
Prepared paints not sold as white lead	6
Total	147

In explanation of the foregoing it may be stated that the samples characterised as genuine are those which have been sold as pure in accordance with the provisions of the Act in restraint of fraudulent marking. This Act prohibits the use of the terms 'pure' or 'genuine,' for white lead in oil, unless the article has the composition specified in schedule A of the Act. The two 'slightly impure' samples were no doubt intended for genuine, and the very small amount of insoluble matter present was probably accidental. The two samples 'not sold as pure' have been called adulterated, although the

vendor showed good faith in making the declaration. The large number of samples sold under special names have been named 'adulterated' in accordance with former practice, and because their sale contravenes the spirit of the Adulteration Act, which defines an article as adulterated if 'any substance has been mixed with it so as to 'reduce, lower or injuriously affect its quality or strength.' Besides, the special names do not indicate the 'mixed' or 'compound' nature of these samples as required by the Act; neither do they declare to the purchaser that he is being served with an inferior article. Twelve samples were sold simply as white lead, but were largely adulterated, and were not labelled as 'compound' or 'mixture.' Finally, seven samples were purchased by the inspectors which were plainly declared to be 'paints' by the vendors and are known to be articles quite different in character from 'white lead in oil.'

I have the honour to be, sir,
Your obedient servant,

THOMAS MACFARLANE,
Chief Analyst.

RESULTS of examining 147

Date of Collection	Nature of Sample.	Number of Sample.	Cost. Quantity.	Cost. $ cts.	Name and Address of Vendor.
1903.	*District of Halifax.*				
Aug. 19..	Anchor, White Lead.....	4347	3 lbs.	0 30	W. A. Poole, Montague, P.E.I....
" 19..	White Paint, mixed ready for use.	4350	3 "	0 30	Capt. Jos. McDonald, Cardigan...
" 22..	London No. 1 White Lead Paint	4355	3 "	0 30	S.W. Crabbe, Charlottetown, P.E.I,
" 24..	White Lead.....	4359	3 "	0 27	Funnell & Chandler " ..
" 24..	"	4360	3 "	0 27	Cameron & Co. " ..
" 25..	Sheffield White (No. 1) Lead ..	4362	3 "	0 24	R. L. Holman, Summerside, P.E.I.
" 27..	London White Lead	4370	3 "	0 30	Matthew & McLean, Souris. ....
" 27..	No. 1 White Lead...	4374	3 "	0 30	Stanley, Shaw & Peardon, Charlottetown.
Sept. 14..	London No. 1 White Lead.....	20351	3 "	0 30	Stairs, Son & Morrow, Halifax, N.S.
" 14..	BB. No. 1 White Lead...	20353	3 "	0 30	H. H. Fuller & Co. " ..
" 14..	White Lead, not sold as pure..	20354	3 "	0 30	Black Bros. & Co. " ..
" 16..	"	20365	3 "	0 30	Martin & Moore " ..
" 16..	" sold as pure.	20366	3 "	0 30	D. Roche " ..
" 16..	" "	20367	3 "	0 30	F. Reardon " ..
" 16..	" " ...	20368	3 "	0 30	Walsh Bros. " ..
" 18..	" sold as Green Seal pure.	20369	3 "	0 30	R. Dawson & Sons, Bridgewater, N.S
" 18..	" sold as genuine....	20370	3 "	0 30	J. E. Kedy " ..
" 18..	" Can No. 023108 ..	20377	3 "	0 30	W. O. Bates " ..
" 19..	" Anchor brand....	20381	3 "	0 30	T. P. Calkin & Co., Kentville, N.S.
" 19..	" London No. 1.....	20382	3 "	0 30	B. H. Dodge " ..
" 22..	" 'London Lead'...	20385	3 "	0 30	W. B. Arthur & Co., Halifax, N.S.
" 22..	" sold as pure.....	20386	3 "	0 30	Wm. Robertson & Son " ..
" 22..	" sold as London No. 1.	20387	3 "	0 30	A. M. Bell & Co. " ..
" 22..	" Green Seal pure...	20388	3 "	0 30	Crowell Bros. " ..
	District of New Brunswick.				
Aug. 10..	Robertson's Warranted Chemically Pure Ground English White Lead.	17920	3 1-lb. tins	0 30	The Jas. Roberton Co. Ltd., St. Johns.
" 10..	London Genuine White Lead Paint.	17921	"	0 30	T. McAvity & Son, St. John, N.B.
" 19..	London White Lead, XX.....	17922	3 2-lb. tins	0 57	Kerr & Robertson " ..
" 19..	White Lead in Oil.....	17923	3 lbs. bulk	0 30	H. L. & J. T. McGowan .....
" 19..	" "	17924	"	0 30	W. M. Rowan, St. John, N.B.. ..
" 19..	" " Green Seal brand.	17925	"	0 30	H. A. Young " ...
" 25..	'Anchor' White Lead, superfine	17940	3 1-lb. tins	0 30	Sussex Mercantile Co. Ltd., Sussex.
" 26..	White Lead in Oil	17943	"	0 30	Winter Co., Moncton, N.B.....
" 26..	" "	17944	"	0 30	The Sumner Co. Ltd., Moncton, N.B.
" 29..	'Anchor' White Lead in Oil...	17952	4 lbs. bulk	0 40	H. M. Kent, Bathurst, N.B. ...
Sept. 8..	Pure White Lead....	17960	3 1-lb. tins	0 30	Dinsmore Bros., St. Stephen, N.B.
" 9..	White Lead in Oil.....	17965	4 lbs. bulk	0 40	G. M. Taylor, Grand Falls, N.B...
" 11..	" "	17968	"	0 40	A. E. Jones, Woodstock, N.B.....
" 11..	" "	17969	"	0 40	W. F. Dibblee & Son, Woodstock..
" 12..	'Green Seal' White Lead	17971	3 2-lb. tins	0 60	Tweedale & Co., Fredericton, N.B.
" 12..	White Lead, not sold as pure..	17972	3 1-lb. tins	0 36	R. Chestnut & Son, Fredericton ...

SESSIONAL PAPER No. 14

Samples of White Lead in oil.

Name and Address of Manufacturer or Furnisher.	Residue insoluble in Nitric Acid, Barytes in most cases.	Sulphuric Acid.	Lime.	Name of Analyst.	Remarks by the Chief Analyst.
	p. c.				
Henderson & Potts, Halifax, N.S.	25·60	Trace.	Trace.	Miss S. E. Wright	Adulterated.
Blundell, Spence & Co., Hull and London, Eng.	86·55	None.	None.	"	Sold as prepared paint.
Henderson & Potts, Halifax, N.S.	42·85	Present.	Present.	"	Adulterated.
Canada Paint Co. Ltd., Montreal.	14·20	None.	None.	"	"
A. Ramsay & Son "	None.	"	"	"	Genuine.
Sheffield Lead and Colour Works.	39·35	"	"	"	Adulterated.
Henderson & Potts, Halifax, N.S.	25·90	"	"	"	"
P. D. Dodds, Montreal, Que.	None.	"	"	"	Genuine.
Henderson & Potts, Halifax, N.S.	41·50	"	Distinct traces.	Miss E. Davidson	Adulterated.
" "	40·00	"	"	"	"
Motley & Co., Dartmouth, N.S.	47·55	"	"	"	Adultera'd, although not sold as pure.
Burrell & Co., London	None.	"	None.	"	Genuine.
A. Ramsay & Son, Montreal, Que.	0·05	"	"	"	"
Baylis "	None.	"	"	"	"
A. Ramsay & Son "	0·10	"	"	"	"
Sherman-Williams, Chicago	0·05	"	"	"	"
Henderson & Potts, Halifax, N.S.	None.	"	"	"	"
Montreal Rolling Mills Co.	"	"	"	"	"
Henderson & Potts, Halifax, N.S.	24·80	"	Traces.	"	Adulterated.
Stairs, Son & Morrow "	39·80	"	"	"	"
Henderson & Potts "	50·65	"	"	"	"
R. C. Jamieson & Son, Montreal.	None.	"	"	"	Genuine.
Henderson & Potts, Halifax, N.S.	38·85	"	Distinct traces.	"	Adulterated.
Sherwin-Williams, Chicago	None.	"	None.	"	Genuine.
The Jas. Robertson Co. Ltd., St. John.	"			Miss S. E. Wright	"
Henderson & Potts, Halifax	"			"	"
" "	46·95			"	Adulterated.
The Jas. Robertson Co. Ltd., St. John.	None.			"	Genuine.
The Canada Paint Co., Montreal.	"			"	"
The Sherwin-Williams Co. "	"			"	"
Henderson & Potts, Halifax and Montreal.	26·05			"	Adulterated.
A. Ramsay & Son, Montreal	56·50			"	"
The Jas. Robertson Co. Ltd., St. John.	None.			"	Genuine.
Henderson & Potts, Halifax	"		None.	"	Adulterated.
Baylis Manufacturing Co., bought out by R. C. Jamieson & Co., Montreal.	"	None.	"	"	Genuine.
Sherwin-Williams & Co., Montreal	"	"	"	"	"
Canada Paint Co., Montreal	"	"	"	"	"
Henderson & Potts, Halifax	"	"	"	"	"
Sherwin-Williams & Co., Montreal	"	"	"	"	"
Canada Paint Co., Montreal	52·40	Present.	3·00	"	Adultera'd, although not sold as pure.

RESULTS of examining 147

Date of Collection	Nature of Sample.	Number of Sample.	Cost. Quantity.	Cost. $ cts.	Name and Address of Vendor.
1903.	*District of Quebec.*				
Aug. 28..	White Lead, guaranteed pure, Assn. No. 955292.	23666	3 lbs. bulk	0 24	Jos. Langlois, Rimouski, Que.....
" 29..	"	23611	3 "	0 20	Tancrède Peltier, Rivière du Loup.
" 29..	"	23612	3 "	0 20	" "
" 31..	Island City Pure Prepared House Paint—Inside white.	23618	3-lb. tins..	0 30	A. Normand, Montmagny.....
Sept. 1..	White Lead	23621	3 lbs. bulk	0 20	Carrière, Laine et Cie, Lévis. .....
" 1..	" guaranteed pure..	23623	3 "	0 24	J. U. Laine, Lévis.....
" 2..	" guaranteed pure, Assn. No. 085880.	23627	3 "	0 25	U. Lemieux et fils, Quebec .....
" 2..	" guaranteed pure, No. 999049.	23628	3 "	0 21	L. C. Giguère, Quebec. .....
" 3..	Pure White Lead.....	23629	3 lbs	0 30	Blais & Huard, Thetford, Que.....
" 4.	Pure White Lead, Association Label No. 26947.	23632	3 "	0 21	Geo. Lamoureux, Weedon, Que....
" 5..	Pure White Lead 'Satin White,' Government standard.	23635	3 lbs. bulk	0 30	W. E. Webster & Son, Coaticooke, Que.
" 5..	Pure White Lead, Association Label 903136.	23636	3 "	0 25	C. A. Kennedy, Coaticooke, Que...
" 15..	White Lead, guaranteed chemically pure, for decorators..	23640	3 "	0 24	W. Chartrand, Ste. Rose, Que.....
" 15..	Bull Dog, Pure Liquid Paint..	23642	3 1-lb. tins	0 27	G. H. Hill, Lachute, Que.....
" 15..	White Lead	23644	3 lbs. bulk	0 18	McFaul Bros., Lachute Mills.....
" 15..	" Label No. 53040. .	23645	3 "	0 30	J. R. Meikle & Co., Lachute .....
" 17..	Pure White Lead.....	23646	3 "	0 20	S. G. Laviolette, St. Jerome.....
" 17..	Pure White Lead, Association Label 840523.	23647	3½ lbs....	0 25	Bruno Beaulieu, " .....
	District of Montreal.				
Aug. 22..	White Lead, marked pure.....	21361	3 lbs. bulk	0 24	S. J. Granger, 679 St. Catherine St., Montreal.
" 24.	" "	21362	3 "	0 24	S. L. Lafleur, 1932 Notre Dame St., Montreal.
" 24..	" "	21363	3 "	0 18	Sauvé & Dagenais, 2044 Notre Dame St. Montreal.
" 24..	" "	21364	3 "	0 24	P. Deniers et fils, 2193 Notre Dame St., Montreal.
" 25..	White Lead, warranted chemically pure, Association Label 24437.	21366	3 lbs . .	0 30	A. Leroux, 2344 Notre Dame St., Montreal.
" 25..	Elephant Brand White Lead, Genuine, Association Label 962448.	21367	3 "	0 24	G. Prudhomme, 174 Centre St., Montreal.
Sept. 14..	White Lead 'Pure'	21368	3 "	0 18	Watts & Malkivot, 1031 Ontario St., Montreal.
" 14..	" "	21369	3 "	0 18	" " "
" 14..	" " No. 28573	21370	3 "	0 24	O. Leblanc, 1118 Ontario St., Montreal.
" 15..	" Genuine, No. 998396	21371	3 "	0 38	A. A. McMartin, St. Joseph St., Lachine.
" 15..	" 'Pure,' No. 066394.	21372	3 "	0 20	W. E. Ranger, Lachine . .....
" 16..	" " No. 912246..	21373	3 "	0 24	Joseph St. Marie, 1 St. Catherine St., Montreal.
" 16..	" No. 938839.....	21374	3 "	0 21	John Miller & Son, 1325 St. Catherine St., Montreal.
" 16..	" 'Pure'	21375	3 "	0 21	F. Martineau, 1381 St. Catherine St., Montreal.
" 16..	" "	21376	3 "	0 24	N. Desjardins, 1560 St. Catherine St., Montreal.

Samples of White Lead in Oil—*Continued.*

Name and Address of Manufacturer or Furnisher.	Residue insoluble in Nitric Acid. Barytes in most cases.	Sulphuric Acid.	Lime.	Name of Analyst.	Remarks by the Chief Analyst.
	p. c.	p. c.	p. c.		
A. Ramsay & Son, Montreal. ...	None.	None.	None.	Miss E. Davidson...	Genuine.
Dodds & Co., Montreal..... ..	"	"	"	" ..	"
Baylis Manufact'g Co., Montreal	2·20	"	"	" ..	Slightly impure.
P. D. Dodds & Co., Montreal....	2·00	Present.	Present.	"	Sold as prepared paint.
Canada Paint Co. "	None.	None.	None.	" ..	Genuine.
P. D. Dodds & Co. " ...	1·00	"	"	" ..	Slightly impure.
Canada Paint Co. " ...	0·40	"	"	" ..	Genuine.
" "	None.	"	"	"	"
The London Paint Co., sold by Henderson & Potts.	44·75	Present.	Trace.	..	Contains much oil and is probably a prepared paint.
Montreal Rolling Mill Co., Montreal.	None.	None.	None.	" ..	Genuine.
The Jas. Robertson Co., Montreal	0·05	"	"	" ..	"
Baylis Manufacturing Co	0·25	"	"	"	"
A. Couillard, Montreal.... ...	None.	"	"	"	"
A. Ramsay & Son, Montreal.....	0·40	"	22·06	..	Sold as prepared paint.
Canada Paint Co. " ...	0·35	"	11·20	.	Adulterated.
" "	None.	"	None.	" ..	Genuine.
P. D. Dodds. " ...	"	"	"	" .	"
Canada Paint Co. "	0·05	"	"	" .	"
P. D. Dodds & Co., Montreal ..	None.	None.	None.	Miss S. E. Wright ..	"
Jas. Robertson & Co. "	"	"	"	. .	"
Baylis Manf'g. Co. " ..	"	"	"	. .	"
P. D. Dodds & Co. "	"	"	"	" .	"
Montreal Rolling Mills Co., Montreal.	"	"	"	" ..	"
Canada Paint Co., Montreal....	"	"	"	" ..	
P. D. Dodds & Co. "	"	"	"	" .	"
C. R. McDowell. "	"	"	Trace.	" ..	"
Baylis Manuf'g. Co. " ...	"	"	None.	" ..	"
Canada Paint Co. "	"	Present.	Present.	" ..	"
Montreal Rolling Mills Co. " . .	"	None	None.	" .	"
" " ...	"	Present.	Present.	" ..	"
Canada Paint Co., Montreal.....	"	None.	None.	" .	"
Vendors....	"	"	"	" ..	"
P. D. Dodds & Co., Montreal....	"	"	"	" ..	"

RESULTS of examining 147

Date of Collection	Nature of Sample.	Number of Sample.	Cost. Quantity.	Cost. $ cts.	Name and Address of Vendor.
1903.	*District of Kingston.*				
Aug. 26..	White Lead, Pure	21418	3 lbs. bulk	0 20	Cameron & Leacock, Smith's Falls.
" 26..	" Genuine, Assn. Stamp No. 11024	21419	3 "	0 20	Clarke & Lewis, Smith's Falls.
" 27..	" Genuine, Assn. Label No. 061159	21420	3 "	0 24	R. F. Smart, King St., Kingston
" 27..	" Pure, Assn. Label No. 060042.	21421	3 "	0 21	A. G. Dobbie & Co., King St., Kingston.
" 27..	" Genuine, Assn. Label No. 06102.	21422	3 "	0 24	B. D. Steacy, King St., Kingston
" 27..	" Assn. Label 044620	21423	3 "	0 21	R. W. Ross & Co., King St., Prescott
" 27..	" " 986294.	21424	3 "	0 21	N. Willard, King St., Prescott
" 28..	" Genuine	21425	3 "	0 24	Jarvo & Co., Pitt St., Cornwall
" 28..	" Warranted Pure.	21426	3 "	0 24	" "
" 28..	" Genuine, Label No. 001795.	21427	3 "	0 40	G. R. Phillips "
Sept. 1..	Government Standard, Pure White Lead.	21430	3 "	0 20	A. E. H. Braithwaite, Gananoque, Ont.
" 1..	Pure White Lead	21431	3 "	0 20	L. W. Bennett & Son, Gananoque, Ont.
Aug. 31..	" Assn. No. 860504	21428	3 "	0 21	W. A. Mitchell, Kingston, Ont.
" 31..	" " 043667	21429	3 "	0 30	Jno. Corbett "
	District of Toronto.				
Sept. 2..	White Lead, Unicorn Brand, Pure, Label No. 47554.	23241	3 lbs.	0 24	F. Hamilton, Hamilton.
" 2..	White Lead, Genuine, Label 92160.	23242	3 "	0 21	Thos. Ramsay, Market Place, Hamilton.
" 2..	" Pure	23243	3 "	0 24	Parke & Parke, Hamilton
" 2..	" " No. 067775.	23244	3 "	0 18	H. A. Webber, King St., Hamilton.
" 3..	" " No. 925651.	23245	3 "	0 24	W. W. Lake, 608 Queen W., Toronto
" 3..	"	23246	3 tins.	0 28	A. Maas, 534 Queen W., Toronto.
" 4..	" Absolutely Pure, No. 861136.	23233	3 lbs.	0 24	W. F. Cockshutt & Co., Brantford.
" 4..	" Pure	23247	3 "	0 24	Howie & Feely, Brantford
" 4..	" Chemically Pure.	23248	3 "	0 24	" "
" 4	" Assn. No. 030724.	23249	3 "	0 20	John Bishop & Son "
" 4..	" Pure	23250	3 "	0 24	T. O. Noble "
" 5..	" "	23252	3 "	0 24	Russil Hardware Co., 126 King East, Toronto.
" 5..	" Absolutely Pure, No. 049198.	23253	3 "	0 30	Thos. Meredith & Co., 156 King St. East.
" 5	" Genuine	23254	2 tins.	0 24	J. J. Murray, 224 Yonge St., Toronto
" 5	" Decorators' Pure.	23255	3 lbs.	0 30	Geo. Pearsall, 417 "
" 5.	" Label No. 892299.	23251	3 "	0 24	T. A. Noble, Brantford
	District of London.				
Aug. 20..	White Lead, Absolutely Pure.	22110	3 lbs.	0 21	Harland Bros., Clinton, Ont.
" 20..	" Elephant Brand	22112	3 "	0 21	Charles C. Lee, Goderich, Ont
" 21..	Decorators' Pure White Lead.	22115	3 "	0 25	Sills & Mundy, Seaforth, Ont.
" 21..	Percy's Extra Standard White Lead.	22116	3 "	0 24	Chesner & Smillie "
" 24..	White Lead, Chemically Pure.	22120	3 "	0 21	J. G. Moser, Blyth, Ont
" 24..	Genuine White Lead	22123	3 "	0 21	W. F. A. Fishlugh, Wingham, Ont
" 24..	Robertson's Pure White Lead.	22124	3 "	0 20	J. D. Burns, Wingham, Ont
" 25	White Lead	22127	3 "	0 25	A. & J. Mucklejohn, Harrison.
" 25..	"	22134	3 "	0 25	H. A. Havill, Walkerton, Ont.
" 26..	"	22139	3 "	0 25	Skelton, Lundy & Co., Palmerston, Ont.

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Samples of White Lead in oil *Continued.*

Name and Address of Manufacturer or Furnisher.	Residue insoluble in Nitric Acid. Baryta in most cases.	Sulphuric Acid.	Lime.	Name of Analyst.	Remarks by the Chief Analyst.
	p. c.	p. c.	p. c.		
P. D. Dodd & Co.	None.	None.	None.	Miss E. Davidson	Genuine.
Canada Paint Co.	0·25	"	"		"
"	None.	"	"	"	"
Montreal Rolling Mills Co.	0·10	"	"	"	"
Canada Paint Co.	0·05	"	"	"	"
Baylis Manufacturing Co.	None.	"	"		"
" "	"	"	"	"	"
Henderson & Potts	"	"	"	"	"
"	"	"	"	"	"
Canada Paint Co.	"	"	"	"	"
Francis Frost & Co.	0·10	"	"	"	"
James Robertson & Co.	0·05	"	"	"	"
A. Ramsay & Son, Montreal.	None.	"	"	"	"
Montreal Rolling Mills Co.	"	"	"	"	"
	0·05	None.	None.	Miss E. Davidson.	Genuine.
Canada Paint Co.	None.	"	"	"	"
P. D. Dodd & Co.	0·80	"	"	"	"
A. Ramsay & Son.	0·20	"	"	"	"
Canada Paint Co.	None.	"	"	"	"
Globe Paint Co.	24·10	"	"	"	Adulterated.
Ontario Lead and Wire Co.	None.	"	"	"	Genuine.
P. D. Dodds & Co.	"	"	"	"	"
Dominion Lead Works, Toronto.	"	"	"	"	"
A. Ramsay & Son.	"	"	"	"	"
P. D. Dodd & Co.	0·05	"	"	"	"
Ontario Lead and Wire Co.	None.	"	"	"	"
" "	"	"	"	"	"
Canada Paint Co.	0·05	"	"	"	"
Francis Frost & Co.	0·10	"	"	"	"
Canada Paint Co.	None.	"	"	"	"
Somerville & Co., Lead and Wire Co., Toronto.	0·15	None.	None.	Miss E. Davidson	Genuine.
Canada Paint Co., Montreal and Toronto.	0·10	"	"	"	"
P. D. Dodd & Co.	0·10	"	"	"	"
Sanderson Pearcy & Co., Toronto	21·15	"	"	"	Adulterated.
James Robertson & Co., Toronto.	None.	"	"	"	Genuine.
Canada Paint Co., Montreal.	0·05	"	"	"	"
James Robertson & Co., Toronto.	0·10	"	"	"	"
A. Ramsay & Son, Montreal	0·05	"	"	"	"
Sanderson, Percy & Co., Toronto.	45·75	"	"	"	Adulterated.
James Robertson & Co., Toronto.	0·05	"	"	"	Genuine.

RESULTS of examining 147

Date of Collection	Nature of Sample.	Number of Sample	Cost. Quantity.	Cost. $ cts.	Name and Address of Vendor.
1903.	*District of London*—Con.				
Sept. 1..	Decorators' Pure White Lead..	22144	3 lbs.....	0 24	John Fennell & Sons, Berlin, Ont..
" 1..	Pure White Lead, Government Standard.	22147	3 "	0 21	Liphardt Bros., Waterloo, Ont ....
" 2..	White Lead	22149	3 "	0 21	W. J. McMurtry, Galt, Ont .....
" 2..	"	22156	3 "	0 21	C. Kloper, Guelph, Ont.. .....
	District of Winnipeg.				
Aug. 20..	White Lead	17482	3 cans.....	0 30	E. Cronter, Gladstone, Man .....
" 21..	"	17486	3 "	0 45	Babb & Kirkland, Portage la Prairie
" 21..	Maple Leaf White Lead.	17488	3 lbs.....	0 45	Brown & Armstrong, Carberry, Man.
" 25..	No. 1 White Lead	17496	3 "	0 45	Frame & Miller.....
" 28..	Superfine White Lead.....	23702	3 "	0 45	Robt. Wyatt, Winnipeg, Man. ..
" 28..	Green Seal White Lead.....	23703	3 "	0 45	Graham & Rolston .....
" 28..	White Lead	23704	3 "	0 30	W. A. Templeton.....
" 28..	Superfine White Lead	23705	3 "	0 30	Leon Abranovich, Winnipeg.....
" 28..	White Lead.....	23706	3 "	0 40	Watt & Gordon " ...
" 28..	Superfine White Lead..	23707	3 "	0 45	Campbell & Son " .....
" 28..	White Lead.....	23709	3 "	0 30	Allaire & Bleau, St. Boniface...
" "	"	23721	3 "	0 45	J. H. Ashdown, Winnipeg .....
Sept. 8..	"	23745	5 "	0 45	Tostier & Co., general store, Red Deer, Alberta.
" 9..	"	21749	3 "	0 45	Peterson & Anderson, hardware, Wetaskiwin.
" 10..	"	21751	3 "	0 30	F. M. Gray, Edmonton.....
" 11..	"	21756	3 "	0 40	W. E. Ross, hardware, Strathcona.
" 15..	"	21764	3 "	0 30	T. R. Stewart, hardware, Calgary.
" 15..	"	21765	3 "	0 25	J. H. Ashdown, Calgary.....
	District of British Columbia.				
Aug. 25..	Island City Pure Prepared House Paints Inside White.	23559	3 cans.....	0 45	R. Mackay, Vancouver, B.C ...
" 25..	Stag Brand Liquid Paint.....	23564	3 "	0 45	J. Main " .....
" 26..	White Lead, chemically pure..	23565	12½ lbs....	0 90	Robertson Godson Co., Vancouver.
" 26..	Extra Warranted White Lead.	23566	12½ " ...	0 85	" " " ..
" 27..	Exterior White Lead	23567	12½ " ...	1 25	Fyfe & Hunter, Vancouver.....
" 27..	Decorator's Pure White Lead..	23568	13 " ...	0 95	P. D. Dods & Co. " .....
" 27..	Bulldog Pure White Lead.....	23569	14½ " ...	1 45	Fyfe & Hunter " .....
" 28..	Special Decorator's White Lead	23570	13 " ...	0 90	P. D. Dods & Co. " ... .
" 29..	No. 1 White Lead	23571	13 " ...	0 90	" " .....
Sept. 10..	White Lead	23593	3 cans	0 75	Wood, Vallant & Leggatt, Vancouver.
" 10..	London White Lead	23594	3 "	0 75	McLennan-McFeeley, Vancouver..
" 10..	No. 1 White Lead	23595	3 "	0 50	P. D. Dods & Co., Vancouver .....

SESSIONAL PAPER No. 14

Samples of White Lead in Oil—*Concluded.*

Name and Address of Manufacturer or Furnisher.	Residue insoluble in Nitric Acid. Barytes in most cases.	Sulphuric Acid.	Lime.	Name of Analyst.	Remarks by the Chief Analyst.
	p. c.				
P. D. Dodd & Co.	None.	None.	None.	Miss E. Davidson.	Genuine.
Elliott & Co., Toronto.	0·05	"	"	"	"
A. Ramsay & Son, Montreal.	20·75	"	"	"	Adulterated.
Montreal Rolling Mills Co.	None.	"	"	"	Genuine.
British North America Colour Co.	44·25	"	"	"	Adulterated
" " " "	58·45	"	"	"	"
G. F. Stephens & Co., Winnipeg.	46·30	"	"	"	"
" " " "	38·30	"	"	"	"
" " " "	39·40	"	"	"	"
The Sherwin-Williams Co.	None.	"	"	"	Genuine.
St. Lawrence Colour Wotks.	43·50	"	"	"	Adulterated
G. F. Stephens, Winnipeg.	39·25	"	"	"	"
British North America Colour Co.	10·70	"	"	"	"
G. F. Stephens, Winnipeg.	37·75	"	"	"	"
Canada Paint Co.	None.	"	"	"	Genuine.
British North America Colour Co.	63·50	"	"	"	Adulterated
G. F. Stephens, Winnipeg.	0·05	"	"	"	Genuine.
Canada Paint Co., Montreal.	0·10	"	"	"	"
A. Ramsay & Son, Montreal.	0·05	"	"	"	"
Sherwin-Williams Co., Montreal.	0·05	"	"	"	"
A. Ramsay & Son, Montreal.	None.	"	"	"	"
Canada Paint Co., Montreal.	"	"	"	"	"
P. D. Dods & Co., Montreal.	10·55	None.	Trace.	"	Sold as prepared paint.
Canada Paint Co., Montreal.	0·40	Present.	14·72	"	"
Dominion Lead Works, Toronto.	None.	None.	None.	"	Genuine.
" " " "	23·70	"	"	"	Adulterated.
A. Ramsay & Sons, Montreal.	39·15	"	"	"	"
P. D. Dods & Co., Montreal.	None.	"	"	"	Genuine.
W. Johnson, Dickson & Co., Montreal.	"	"	"	"	"
P. D. Dods & Co., Montreal.	27·05	"	Trace.	"	Adulterated.
" " " "	34·60	"	"	"	"
British North America Paint Co., Victoria.	61·00	"	"	"	"
A. Ramsay & Co., Montreal.	39·40	"	9·40	"	"
P. D. Dods & Co., Montreal.	44·45	"	None.	"	"

APPENDIX F.

BULLETIN No. 92--DISTILLED LIQUORS.

OTTAWA, November 25, 1903.

W. J. GERALD, Esq.,
Deputy Minister of Inland Revenue.

SIR,—I beg to transmit herewith inclosed a report by Mr. McGill on the samples of distilled liquors which were collected in accordance with your instructions of August 11 last. The report is accompanied by a tabulated statement which describes the origin of the samples and the results obtained in their examination.

I am, sir, your obedient servant,

THOMAS MACFARLANE,
Chief Analyst.

OTTAWA, October 31, 1903.

THOMAS MACFARLANE, Esq., F.R.S.C., &c.,
Chief Analyst.

SIR,—I beg to hand you my report on 216 samples of liquors. These consist of the following :—

Rye whiskey	91	Samples.
White "	30	"
Scotch "	24	"
Irish "	2	"
Gin	27	"
Rum	12	"
Brandy	30	"
	216	"

No deleterious substances have been found in any of these samples.

In accordance with special instructions, I have made examination for alkaloids in all whiskey samples having less than 75 per cent proof strength. A negative result was obtained in every case.

The principal adulterant is water. In order to enable me to say whether or not a sample may be styled 'adulterated' from dilution with water, it is necessary to recognize some standard strength for alcohol. The British 'Sale of Food Amendment Act' of 1879 fixed the minimum limit strength for gin at 65 per cent, and that for brandy, rum and whiskey at 75 per cent of proof spirit.

Although these limits are not legally recognized in Canada, I have used them (in the absence of any other standard) for purposes of comparison.

The following summary will show, at a glance, the result of their application :—

Kind.	Total Number of Samples.	Above Standard Strength.	Below Standard Strength.	Percentage.	
				Above.	Below.
Rye whiskey	91	25	66	27·5	72·5
White "	30	5	25	17·0	83·0
Scotch "	24	22	2	92·0	8·0
Irish "	2	2	0	100·0	0·0
Gin	27	19	8	70·0	30·0
Rum	12	11	1	92·0	8·0
Brandy	30	25	5	83·0	17·0

From this table it appears that the liquors most tampered with are those which are most in demand, viz :—whiskey (rye and malt) and gin.

The last examination of liquors of this character made by me was in 1891 ;* and it is interesting to compare the results then obtained with those shown in the above table. This I have done in the subjoined table, where percentage numbers are used.

Kind of Liquor.	Collection of 1903.			Collection of 1891.		
	Number Examined.	Above Standard.	Below Standard.	Above Standard.	Below Standard.	Number Examined.
Rye whiskey	91	27·5	72·5	23·0	77·0	61
White "	30	17·0	83·0	12·0	88·0	33
Scotch "	24	92·0	8·0	77·0	23·0	22
Irish "	2	100·0	0·0	80·0	20·0	10
Gin	27	70·0	30·0	100·0	0·0	19
Rum	12	92·0	8·0	86·0	14·0	13
Brandy	30	83·0	17·0	84·0	16·0	24

Except in the case of gin and brandy the above comparison shows a decided improvement in the quality of these spirits in the interval of twelve years. Gin shows a noteworthy falling off in spirit strength.

The term 'spirit gravity' is used in the tables to signify the gravity which the liquor would have, provided that nothing else than alcohol and water were present. Of course the original gravity of the liquor is always higher than the spirit gravity, from the presence in it of matter in solution (sugar, caramel, tannins, glycerine, &c.) having a density higher than water.

In calculating the percentage of alcohol (and proof spirit) from the 'spirit gravity,' the tables of O. Hehner have been used. These tables are sanctioned by the excise regulations of our own country, as well as in England, Germany and elsewhere.

I may add that the furfurol test, and the production of a distinct turbidity (opalescense) on addition of water to the distillate, are the chief means we possess for discriminating between a liquor which has been produced by direct distillation from the 'mash,' and one which has been manufactured by reducing rectified spirit with water to the desired strength, and further addition of flavouring or colouring matter. Scotch and Irish whiskies, gin, rum and brandy are liquors of the first type (sometimes spoken of as pot-still spirits). Rye whiskey and white whiskey (malt whiskey) are usually manufactured from rectified spirit.

Fuller details regarding this aspect of the question are given in Bulletin 27 of this series.

I have received valuable assistance in carrying out this investigation from Mr. Lemoine and Mr. Valin.

I have the honour to be, sir, your obedient servant,

A. McGILL.

* Bulletin 27.

INSPECTION OF RYE WHISKEY—

Date of Collection	Nature of Sample.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher.	Number of Sample.
Aug. 27	Rye Whiskey	M. J. Foley, Souris, P.E.I.	Sullivan & Co., St. John, N.B.	4371
Sept. 8		Kelley & Glassey, Halifax, N.S.	Gooderham & Worts, Toronto, Ont.	20335
" 9		J. Hogan, Halifax, N.S.	Unknown	20340
" 19		J. McIntosh, Kentville, N.S.	H. Walker, Walkerville	20383
Aug. 22	'Imperial'	Henry Finnegan, St. John, N.B	" "	17938
" 24	'Seagram's Canadian.'	McIntyre & Comeau "	Seagram Distillery, Waterloo, Ont.	17939
" 25		C. H. Fairweather, Sussex, N.B.	H. Corby, Belleville, Ont.	17942
" 26		P. Gallagher, St. John, N.B.	Wm. Marshall, Hamilton, Ont.	17948
Sept. 8		Frank Smith, St. Stephen, N.B.	H. Walker & Sons, Walkerville, O.	17961
" 10		P. D. Bourgoin, Grand Falls, N.B.	" "	17967
Aug. 28		A. Caron, Rimouski	Wiser, Prescott, Ont.	24503
" 29		J. W. Anctil, Rivière du Loup	N. Rioux, Quebec	24505
" 31		Damiens & Cie. "	J. Baillargeon, Quebec	24507
" 31		Tetû Frères, Montmagny, Que.	H. Walker, Walkerville	24508
Sept. 1		A. G. Lambert, Levis, Que	Whitehead & Turner, Quebec	24510
" 1		A. W. Couture "		24512
" 3		J. H. Lessard, Thetford, Que	Walker's	24516
" 5		A. Trudeau, Coaticook, Que.	"	24518
" 16		Alex. Berriquer, Lachute Mills	F. X. St. Charles, Montreal	24520
" 17		P. Simard, St. Jérôme	Gooderham & Worts, Toronto	24522
" 17		Ed. Langlois "	P. Simard, St. Jérôme	24524
Aug. 18		Desjardin & Co., 65 Commissioners St., Montreal.	D. Lariverre & Co.	21323
		Louis Payette & Co., 125 Commissioners St., Montreal.	L. O. Wilson & Co.	21324
Aug. 18		T. N. Laganier, 11 Commissioners St., Montreal.	L. Chaput, Fils & Co., Montreal.	21327
" 20		Joseph Valiquette, Montreal.	Purchased with other stock from J. Octeau.	21334
" 20		T. Brisson, 139 Commissioners St.	Not given	21336
" 20		A. Charbonean, 12 William St., Montreal.	L. Chaput & Co	21337
" 20		E. Gauvreau, 185 Commission'rs St.	Blended by vendor.	21341
" 21		J. Frail, 133 Commissioners St.	Boivin, Wilson & Co.	21343
" 21		Emile Delisle, 522 Lagauchetière St.	F. X. St. Charles, Montreal	21346
" 21		Dame & Frère, 1356 DeMontigny St.	L. Chaput et Fils, Montreal	21348
" 21		Thos. Barry, 864 St. Dominique St.	" "	21349
		D. Ashdanase, 573 Marie Anne	Laporte, Martin & Co., Montreal	21351
		Oscar Rivet, 2394 Notre Dame St.	Not given	21353
Aug. 21		Mde. Lapierre, 3735 Notre Dame St., St. Cunegonde.	Laporte, Martin & Co., Montreal.	21356
" 21		J. Nevu, Notre Dame St., St. Henri.	Not given	21357
		V. Boileau, 836 St. Catherine St.	Bottled by vendor	21360
Aug. 26		E. Kennedy, Smith's Falls, Ont.	J. P. Wiser	21438
" 26		McDermott & McCarthy, Prescott.	Bottled by vendor	21442
" 27		Antoine Wendling, Brockville	Taken from bottle as served at bar	21440
" 31		E. Halliday, Kingston, Ont.	" "	21445
" 31		Thos. J. Leahy "	Meagher Bros., Montreal.	21446
" 31		Jas. McParland "	Gooderham & Worts, Toronto	21447
" 31		J. Halligan "	Bottled by vendor	21449
" 31		Rigney & Hickey "	"	21451
		C. McLean "	Taken from vessel in bar. Seagram's.	21453
Aug. 31		Chas. Lyon, Kingston	Taken from vessel in bar, Seagram's.	21454

SESSIONAL PAPER No. 14

Tabulated Statement.

RESULT OF ANALYSIS.

Specific Gravity of Sample.	Spirit Gravity	Difference.	Fixed Matter.	Alcohol.		Proof Spirit.	Observations.				
				Weight.	Volume.						
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.					
·9464	·9441	·0023	.....	37·61	44·73	78·39	Above	British standard strength in alcohol by 3·39 per cent proof spirit.			
·9500	·9484	·0016	2·400	35·30	42·17	73·91	Below	"	1·09	"	"
·9477	·9444	·0033	4·200	37·44	44·55	78·07	Above	"	3·07	"	"
·9623	·9615	·0008	1·720	27·57	33·39	58·53	Below	"	16·47	"	"
·9438	·9429	·0009	1·680	38·28	45·47	79·68	Above	"	4·68	"	"
·9474	·9432	·0042	6·320	38·11	45·28	79·36	"	"	4·36	"	"
·9594	·9583	·0011	1·530	29·67	35·81	62·76	Below	"	12·24	"	"
·9602	·9593	·0009	1·720	29·00	35·05	61·42	"	"	13·58	"	"
·9529	·9523	·0006	1·260	33·29	39·94	69·99	"	"	5·01	"	"
·9444	·9429	·0015	1·700	38·28	45·47	79·68	Above	"	4·68	"	"
·9529	·9520	·0009	3·500	33·47	40·14	70·34	Below	"	4·66	"	"
·9561	·9543	·0018	2·700	32·06	38·53	67·55	"	"	7·45	"	"
·9707	·9682	·0025	3·940	22·69	27·68	48·50	"	"	26·50	"	"
·9527	·9509	·0018	2·100	34·10	40·84	71·58	"	"	3·42	"	"
·9544	·9538	·0006	0·960	32·37	38·89	68·17	"	"	6·83	"	"
·9606	·9588	·0018	2·540	29·33	35·43	62·09	"	"	12·91	"	"
·9484	·9480	·0004	1·000	35·50	42·40	74·30	"	"	0·70	"	"
·9635	·9622	·0013	1·780	27·67	32·81	57·51	"	"	17·49	"	"
·9483	·9453	·0030	2·500	36·94	44·00	77·10	Above	"	2·10	"	"
·9473	·9450	·0023	2·420	37·11	44·18	77·42	"	"	2·42	"	"
·9496	·9484	·0012	2·360	35·30	42·17	73·91	Below	"	1·09	"	"
·9689	·9684	·0005	0·800	22·54	27·49	48·18	"	"	26·82	"	"
·9666	·9656	·0010	1·220	24·69	30·04	52·64	"	"	22·36	"	"
·9701	·9694	·0007	1·86	21·77	26·58	46·59	"	"	28·41	"	"
·9639	·9620	·0010	1·740	26·60	32·27	56·55	"	"	18·45	"	"
·9703	·9699	·0004	0·660	21·38	26·13	45·79	"	"	29·21		
·9708	·9699	·0009	1·640	21·38	26·13	45·79	"	"	29·21	"	
·9694	·9689	·0005	1·460	22·15	27·01	47·39	"	"	27·61	"	
·9603	·9597	·0006	1·200	28·75	34·76	60·91	"	"	14·09	"	
·9660	·9652	·0008	1·220	25·00	30·40	53·27	"	"	21·73	"	
·9610	·9591	·0019	1·200	29·13	35·20	61·69	"	"	13·31	"	
·9548	·9531	·0017	1·540	32·81	39·40	69·04	"	"	5·96	"	
·9589	·9580	·0009	1·380	29·87	36·04	63·17	"	"	11·83	"	
·9612	·9602	·0010	2·100	28·44	34·40	60·28	"	"	14·72	"	
·9696	·9679	·0017	1·080	22·92	27·95	48·98	"	"	26·02	"	
·9690	·9662	·0028	3·280	24·23	29·49	51·69	"	"	23·31	"	
·9646	·9638	·0008	1·020	26·00	31·57	55·32	"	"	19·68		
·9553	·9542	·0011	2·280	32·12	38·60	67·67	"	"	7·33	"	
·9616	·9611	·0007	1·640	27·86	33·73	59·11	"	"	15·89	"	
·9484	·9476	·0008	1·30	35·70	42·62	74·68	"	"	0·32	"	"
·9481	·9475	·0006	1·360	35·75	42·67	74·78	"	"	0·22	"	"
·9511	·9492	·0019	4·440	34·90	41·74	73·14	"	"	1·86	"	"
·9476	·9465	·0011	2·720	36·28	43·26	75·80	Above	"	0·80	"	"
·9569	·9554	·0015	1·340	31·37	37·76	66·18	Below	"	8·82	"	"
·9470	·9460	·0010	2·620	36·06	43·01	76·34	Above	"	1·34	"	"
·9629	·9608	·0021	1·960	28·06	33·97	59·53	Below	"	15·47	"	
·9517	·9509	·0008	2·44	34·10	40·84	71·58	"	"	3·42	"	"

INSPECTION OF RYE WHISKEY—

Date of Collection.	Nature of Sample.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher.	Number of Sample.
Sept. 2		D. Smith, Market Sq., Hamilton	Murray & Lottridge, Hamilton	23201
" 2		Chas. Schwenger "	Not given	23203
" 2		P. J. Galvin "	"	23205
" 2		Hazell & Sons, King St. "	Bottled by vendor	23207
" 2		J. O. Carpenter "	"	23208
" 3		John Mathers, 152 King West, Toronto.	"	23210
" 3		Geo. Stram, 252 King West, Toronto.	Kept on draught in bar	23212
" 3	Fine Old Canadian Rye.	E. Morgan, 491 Queen East, Toronto.	Bottled by vendor	23213
		C. E. Vardon, 543 Queen East, Toronto.	"	23216
Sept. 3		M. Wade, 502 Portland St., Toronto.	Kept on draught	23217
" 3		T. Reynolds, 837 Queen East, Toronto.	Bottled by vendor	23220
Aug. 20		Thos. J. Bell, Clinton, Ont	Hiram Walker, Walkerville, Ont.	22111
" 20		W. W. Sault, Goderich	Lucas, Steele & Bristow, Hamilton	22113
" 25		Jeremiah Miller, Harrison, Ont.	Gooderham & Worts, Toronto	22128
" 25		John Garbet "	Joseph Seagram, Waterloo	22129
" 25		Richard Handly, Walkerton	"	22133
" 25		Louis Plaff, Mount Forest	Gooderham & Worts, Toronto	22137
Sept. 1		Joseph E. Seagram, Waterloo	Joseph E. Seagram	22146
" 2		W. G. Bernhart, Galt, Ont	Royal Distillery, Hamilton	22151
" 2		John Stockfish, Preston, Ont	Joseph E. Seagram, Waterloo	22152
" 2		Joseph Weyper, Preston	Royal Distillery, Hamilton	22153
		Harding Bros., Guelph	H. Walker & Son, Walkerville	22154
Sept. 2		Frank Hall, Guelph, Ont	H. Walker & Sons, Walkerville	22155
" 2		E. Dawson, Seaforth	H. Corby, Belleville	22157
Aug. 29		A. Bernard, Winnipeg	J. E. Seagram, Waterloo, Ont	23713
" 29		Paul Sala "	H. Walker & Sons, Walkerville, Ont.	23714
" 29		J. Lemaire "	" "	23715
" 30		Belevian & Co. "	" "	23716
Sept. 3		S. Demers "	G. F. J. Gates, Winnipeg	23717
" 3		D. Ripsteins "	Geo. Vetu, Winnipeg	23719
" 4		T. D. Cavanmagh, Winnipeg		23720
" 8		T. F. Ellis, Red Deer	H. Walker Sons, Walkerville	21746
" 10		A. Laurandeau, Edmonton	Gooderham & Worts, Toronto	21750
" 10		F. X. Paré & Co., Strathcona	H. Walker & Sons, Walkerville	21758
" 15		R. J. McKeran "	Gooderham & Worts, Toronto	21759
" 15		J. A. Young, Calgary	Hiram Walker, Walkerville	21762
" 15		Jas. Doyle "	Gooderham & Worts, Toronto	21763
Aug. 25		W. Jones, Vancouver	Hudson Bay Co., Vancouver	23554
" 25		T. Roberts "	Pither & Leiser, Victoria	23555
" 25		A. Calore, Europe Hotel, Vancouver.	"	23557
" 25		Geo. Waring, Nanaimo	Hudson Bay Co., Victoria	23581
" 28		F. Mondor, St. Boniface	Gooderham & Worts, Toronto	23708
" 21		T. A. Newman Bros., Portage la Prairie.	" "	17487 17497

NOTE. Of 91 samples of rye whiskey 25 are above standard strength in alcohol, and 66 are below that trength.

All samples below standard strength have been examined for alkaloids. No alkaloids have been found.

None of the samples gave reactions for furfurol.

None of the distillates gave any opalescence on diluting with water.

SESSIONAL PAPER No. 14

Tabulated Statement—*Continued.*

Result of Analysis.											
Specific Gravity	Spirit Gravity	Difference.	Fixed Matter.	Alcohol. Weight.	Alcohol. Volume.	Proof Spirit.	Observations.				
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.					
·9604	·9594	·0010	1·06	28·94	34·97	61.29	Below	British standard strength in alcohol by 13·71 per cent proof spirit.			
·9632	·9621	·0011	1·20	27·14	32·90	57·65	"	"	17·35	"	"
·9515	·9512	·0003	1·14	33·94	40·67	71·27	"	"	3·73	"	"
·9547	·9532	·0015	1·02	32·75	39·32	68·92	"	"	6·08	"	"
·9552	·9542	·0010	0·86	32·12	38·60	67·67	"	"	7·33	"	"
·9514	·9493	·0021	6·04	34·68	41·69	73·05	"	"	1·95	"	"
·9654	·9638	·0016	2·10	26·00	31·57	55·32	"	"	19·68	"	
·9483	·9465	·0018	4·16	36·28	43·26	75·80	Above	"	0·80	"	
·9477	·9469	·0008	2·26	36·06	43·01	75·37	"	"	0·37	"	
·9603	·9597	·0006	2·98	28·75	34·76	60·91	Below	"	14·09	"	
·9653	·9636	·0017	1·84	26·13	31·72	55·59	"	"	19·41	"	
·9584	·9577	·0007	1·14	30·06	36·26	63·55	"	"	11·45	"	
·9484	·9480	·0001	1·08	35·50	42·40	74·30	"	"	0·70	"	
·9642	·9621	·0021	2·82	27·14	32·90	57·65	"	"	17·35	"	
·9482	·9450	·0032	5·46	37·11	44·18	77·42	Above	"	2·42	"	
·9575	·9573	·0002	0·140	30·28	36·51	63·99	Below	"	11·01	"	
·9472	·9466	·0006	2·740	36·22	43.19	75·70	Above	"	0·70	"	
·9485	·9474	·0011	1·920	35·80	42·73	74·88	Below	"	0·12	"	
·9607	·9600	·0007	2·12	28·56	34·54	60·53	"	"	14·47	"	
·9474	·9460	·0014	1·90	36·56	43·56	76·34	Above	"	1·34	"	
·9609	·9603	·0006	2·06	28·37	34·33	60·16	Below	"	14·84	"	
·9477	·9470	0·007	1·12	36·00	42·95	75·26	Above	"	0·26	"	
·9496	·9480	·0016	0·96	35·50	42·40	74·30	Below	"	0·70	"	
·9604	·9596	·0008	2·00	28·81	34·83	61·04	"	"	13·96	"	
·9591	·9575	·0016	4·88	30·17	36·39	63·77	"	"	11·23	"	
·9492	·9485	·0007	1·22	35·25	42·12	73·81	"	"	1·19	"	
·9607	·9600	·0007	0·90	28·56	34·54	60·53	"	"	14·47	"	
·9579	·9560	·0019	1·32	31·00	37·34	65·43	"	"	9·57	"	
·9528	·9520	·0008	2·16	33·47	40·14	70·34	"	"	4·66	"	
·9475	·9463	·0012	2·60	36·39	43·38	76·02	Above	"	1·02	"	
·9703	·9689	·0014	2·78	22·15	27·04	47·39	Below	"	27·61	"	
·9443	·9435	·0008	1·56	37·94	45·10	79·04	Above	"	4·04	"	
·9475	·9466	·0009	2·44	36·22	43·19	75·70	"	"	0·70	"	
·9510	·9498	·0012	1·52	34·62	41·42	72·59	Below	"	2·41	"	
·9485	·9464	·0021	2·40	36·33	43·32	75·91	Above	"	0·91	"	
·9626	·9509	·0117	30·08	34·10	40·84	71·58	Below	"	3·42	"	
·9487	·9466	·0021	2·56	36·22	43·19	75·70	Above	"	0·70	"	
·9485	·9477	·0008	1·48	35·65	42·56	74·59	Below	"	0·41	"	
·9479	·9453	·0026	2·60	36·94	44·00	77·10	Above	"	2·10	"	
·9479	·9463	·0016	1·86	36·39	43·38	76·02	"	"	1·02	"	
·9489	·9463	·0026	2·42	36·39	43·38	76·02	"	"	1·02	"	
·9483	·9460	·0023	2·40	36·56	43·56	76·34	"	"	1·34	"	
·9477	·9467	·0010	2·28	36·17	43·13	75·59	"	"	0·59	"	
·9494	·9480	·0014	1·10	35·50	42·40	74·30	Below	"	0·70	"	

The solid (fixed) matter in solution varies from 0·14 to 30·08 parts per 1,000. (Weight in volume.)

It averages about 2 parts per 1,000 (= 0·2 per cent), and instances of great variation from this number are exceptional.

The solid matter is essentially tannins and caramelized sugar.

No deleterious substances have, in any case, been found.

INSPECTION OF WHITE WHISKEY—

Date.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher as given by Vendor.	Number of Sample.
Aug. 27..	M. J. Foley, Souris, P.E.I.	Sullivan & Co., St. John, N.B.	4371
" 28..	Rinfret et Fils, Rimouski, Que.	Wiser, Prescott	24501
" 28..	A. Caron, Rimouski, Que.	" "	24502
" 29.	Geo. St. Pierre et Cie., Rivière du Loup	Corby, Belleville	24506
Sept. 1..	A. Saunders, Lévis	Ed. Couture, Lévis	24513
Aug. 18..	J. Colas, 63 Commissioners St., Montreal	L. D. Wilson, Montreal	21320
" 18..	Louis Payette & Co., 125 Commissioners	" "	21325
" 18..	E. Delcourt, 38 St. Paul St.	Mathieu Frères, Montreal	21328
" 18	H. Courtois, 39 St. Paul St.	L. D. Wilson & Co., Montreal	21331
" 20..	Joseph Valiquette, 127 Commissioners	Not given	21335
" 20..	L. McNiece, 121 Duke St	"	21339
" 20..	A. J. Oviell, 155 Wellington	Laporte, Martin & Co., Montreal	21340
" 20..	J. Fraid, 133 Commissioners	Boivin, Wilson & Co., Montreal	21344
" 21..	Mde. Lapierre, 3735 Notre Dame	Laporte, Martin & Co., Montreal	21354
" 22..	P. Barnage, 635 Notre Dame	F. X. St. Charles, Montreal	21358
" 26.	E. Kennedy, Smith's Falls, Ont.	J. P. Wiser, Prescott	21439
" 31..	Rigney & Hickey, Kingston, Ont.	Bottled by vendor	21450
Sept. 2	J. D. Carpenter, Market Sq., Hamilton	" "	23209
" 3..	John Mathers, 152 King St. W., Toronto	" "	23211
" 3..	M. Wade, 502 Portland St., Toronto	Kept on draught	23218
Aug. 22..	Joseph Weber, Seaforth, Ont.	Joseph Seagram, Waterloo	22117
Sept. 1..	W. G. Bernhardt, Galt, Ont.	" "	22150
" 8..	Thomas Quirk, Stratford, Ont.	Royal Distillery, Hamilton	22158
Aug. 24..	R. E. Trumbell, Brandon, Man.	Gooderham & Worts, Toronto	17492
Sept. 3.	D. Cleland, Winnipeg	" " "	23718
" 9..	Nils Schmidt, Wetaskiwin, Alta	Hamilton Distillery, Hamilton, Ont.	21747
Aug. 22..	P. Barnage, 635 Notre Dame St., Montreal	F. X. St. Charles, Montreal	21358
" 31..	Jas. McParland, Kingston.	Gooderham & Worts	21448
" 21.	D. Ashdanase, 573 Marie Anne St., Montreal	Chaput et Fils, Montreal	21350
Sept. 5..	A. Rousseau, Coaticook	C. A. French, Sherbrooke	24517

NOTE. All samples below standard strength (75 per cent of proof) have been examined for alkaloids. Of 30 samples of white whiskey, 25 are below standard, 20 being more than 5 per cent below and 18

IRISH

Aug. 22..	H. Finnegan, 224 Pr. William St., St. John, N.B.	Edward & J. Burke, Dublin, Ireland.	17937
Sept. 8..	J. W. Smith, Water St., St. Stephen, N.B.	Dublin Whiskey Distillery Co., Dublin, Ireland.	17962

NOTE. Both of these samples gave decided reactions for furfurol, and opalescence on dilution of the

SESSIONAL PAPER No. 14

Tabulated Statement.

Specific Gravity of Sample.	Spirit Gravity	Difference.	Solids. Parts per thousand	Alcohol. Weight.	Alcohol. Volume	Proof Spirit.	Observations.
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	
·9464	·9441	·0025	.....	37·61	44·73	78·39	Above British standard strength in alcohol by 3·39 per cent of proof spirit.
·9547	·9540	·0007	0·32	32·25	38·75	67·92	Below " 7·08 " "
·9582	·9577	·0005	0·64	30·06	36·26	63·55	" " 11·45 " "
·9647	·9641	·0006	0·26	25·79	31·32	54·88	" " 20·12 " "
·9620	·9617	·0003	0·14	27·43	33·23	58·24	" " 16·76 " "
·9696	·9694	·0002	0·06	21·77	26·58	46·59	" " 28·41 " "
·9654	·9652	·0002	0·12	25·00	30·40	53·27	" " 21·73 " "
·9681	·9681	·0000	0·08	22·77	27·77	48·66	" " 26·34 " "
·9618	·9614	·0004	0·06	27·64	33·48	58·67	" " 16·33 " "
·9682	·9681	·0001	0·22	22·77	27·77	48·66	" " 26·34 " "
·9759	·9753	·0006	0·10	17·00	20·89	36·60	" " 38·40 " "
							Lowest spirit strength.
·9701	·9697	·0004	0·40	21·54	26·31	46·11	" " 28·89 " "
·9702	·9700	·0002	0·08	21·31	26·04	45·63	" " 29·37 " "
·9689	·9685	·0004	0·12	22·46	27·40	48·02	" " 26·98 " "
·9730	·9728	·0002	0·24	19·00	23·28	40·80	" " 34·20 " "
·9587	·9586	·0001	0·08	29·47	35·58	62·36	" " 12·64 " "
·9421	·9389	·0032	10·06	40·35	47·72	83·64	Above " 8·64 " "
							Highest spirit strength.
·9476	·9473	·0003	0·15	35·85	42·78	74·97	Below " 0·03 " "
·9467	·9465	·0002	0·06	36·28	43·26	75·80	Above " 0·80 " "
·9631	·9615	·0016	3·86	27·57	33·39	58·53	Below " 16·47 " "
·9530	·9509	·0021	2·80	34·10	40·84	71·58	" " 3·42 " "
·9500	·9494	·0006	0·16	34·81	41·63	72·96	" " 2·04 " "
·9519	·9518	·0001	0·38	33·59	40·27	70·57	" " 4·40 " "
·9480	·9460	·0020	2·10	36·56	43·56	76·34	Above " 1·34 " "
·9567	·9551	·0016	1·40	31·56	37·97	66·55	Below " 8·45 " "
·9492	·9473	·0019	.....	35·85	42·78	74·97	" " 0·03 " "
·9723	·9722	·0001	.....	19·50	23·88	41·85	" " 33·15 " "
·9449	·9429	·0020	5·84	38·28	45·47	79·68	Above " 4·68 " "
·9677	·9677	·0000	0·16	23·08	28·13	49·30	Below " 25·70 " "
·9647	·9645	·0002	0·16	25·50	30·98	54·30	" " 20·70 " "

No alkaloids have been found in any sample.
more than 10 per cent below, while 13 samples are more than 20 per cent below standard.

WHISKEY.

·9435	·9407	·0028	2·80	39·45	46·75	81·93
·9101	·9087	·0014	0·94	54·14	61·98	108·62

distillate with water.

INSPECTION OF SCOTCH WHISKEY—

Date.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher as given by Vendor.	Name of Brand.	Number of Sample.
1903.				
Sept. 8..	Kelly & Glassey, Halifax	Sheriff & Co., Scotland		20357
" 9..	T. H. Renner, Halifax	McPherson & Co., Scotland	Fernbank***	20339
" 10..	James Scott & Co., Halifax	Bullock Lade, Scotland		20344
" 10..	C. D. Norton, Halifax	Cameron & Co., Scotland		20345
" 10..	T. F. Courtney & Co., Halifax	Bullock Lade, Scotland		20347
" 11..	T. Pearson, Halifax			20350
" 10..	Town of Bridgewater, Bridgewater	J. Buchanan & Co	The Buchanan Blend	20375
Aug. 21..	Byrne Bros., Charlottetown	Cowan & Co., Glasgow		4353
" 24..	A. McDonald, Charlottetown	Bullock, Lade & Co., Scotland		4358
" 25..	P. N. Enman, Sunnyside	Haigge & Haigge, St. John, N.B.		4365
" 21..	McIntyre & Comeau, St. John, N.B	M. B. Foster & Sons, London and Glasgow	Bugle brand	17932
" 21..	R. Sullivan & Co., St. John, N.B.	Mackie & Co., Ltd., Glasgow		17934
" 26..	A. E. Holstead, Moncton, N.B.	Wright & Greigs, Glasgow	Premier	17947
Sept. 12..	McDonald & Heeney, Fredericton.	James Buchanan & Co., Glasgow, Scotland		17975
Aug. 18..	E. Delcourt, 38 St. Paul St., Montreal	J. Townsend, Montreal		21329
" 20..	E. Gauvreau, 185 Commissioner St., Montreal	Blended by vendor		21342
" 31.	Thos. J. Leahy, Kingston, Ont.	Mitchell's		21445
Sept. 10..	J. Diamond, Edmonton	Hugh McKinnon, Glasgow, Scotland		21752
Aug. 25..	C. Anderson, Vancouver	J. Dewar, Scotland		23552
25..	R. Asbeith, Vancouver	White & McKay, Scotland		23556
Sept. 2..	J. Mahrer, Nanaimo	J. Watson & Co., Dundee, Scotland		23582
" 6	Faith & Seeley, New Westminster.	Pither & Lerser, Victoria		23592
				4354
				22159

NOTES.—1. A furfurol reaction was obtained, more or less distinctly, with all samples of Scotch proof (= B. 30 under proof). 3. The average fixed matter in solution is 1·54 per thousand

SESSIONAL PAPER No. 14

Tabulated Statement.

Result of Analysis.							Observations.
Specific Gravity	Spirit Gravity	Difference.	Solids Parts per 1,000.	Alcohol. Weight.	Alcohol. Volume	Proof Spirit.	
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	
·9402	·9391	·0011	2·48	40·25	47·62	83·45	No opalescence on dilution of distillate.
·9392	·9384	·0008	0·46	40·60	47·99	84·11	No opalescence on dilution of distillate.
·9475	·9457	·0018	2·60	36·72	43·75	76·67	
·9435	·9430	·0005	0·74	38·22	45·41	79·57	
·9384	·9376	·0008	1·58	41·00	48·43	84·87	
·9587	·9568	·0019	4·14	30·56	36·83	64·54	Below standard strength in alcohol.
·9381	·9374	·0007	1·60	41·10	48·54	85·06	
·9432	·9427	·0005	0·72	38·39	45·59	79·89	
·9238	·9223	·0015	1·36	48·14	55·93	98·01	
·9384	·9377	·0007	1·16	40·95	48·37	84·77	
·9425	·9422	·0003	0·54	38·67	45·89	80·43	
·9381	·9366	·0015	2·04	41·50	48·97	85·81	
·9415	·9403	·0012	1·36	39·65	46·97	82·31	
·9389	·9377	·0012	1·70	40·95	48·37	84·77	
·9494	9488	·0006	0·80	35·10	41·95	73·52	
·9262	·9243	·0019	2·64	47·23	54·99	96·39	
9264	·9260	·0004	0·82	46·46	54·19	94·97	
·9140	9130	0010	1·60	52·23	60·07	105·27	
·9111	·9105	·0006	0·62	53·35	61·19	107·23	
·9258	·9246	·0012	2·56	47·09	54·85	96·12	
·9170	·9163	·0007	1·02	50·83	58·67	102·82	No opalescence on dilution of distillate.
·9399	·9385	·0014	3·02	40·55	47·94	84·02	Furfurol reaction doubtful.
·9425	·9416	·0009	0·92	39·00	46·26	81·07	
·9377	9374	·0003	0·42	41·10	48·54	85·06	

Whiskey, except No. 23582.

2. The average spirit strength of these samples is 86·70 per cent of (= 0·154 per cent weight in volumes).

INSPECTION OF GIN—

Date.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher as given by Vendor.	Number of Sample.
Aug. 25..	J. D. Gourlay, Sunnyside, P.E.I.	Beale & Co., St. John, N.B.	4364
Sept. 10..	Jas. Scott & Co., Halifax, N.S.	Heukes, Holland, bottled by vendor.	20343
" 10..	T. F. Courtenay & Co., Halifax	" "	20346
" 18..	Town of Bridgewater, N.S.	" "	20376
Aug. 22..	J. D. Regan, St. John	John De Kuyper & Son, Rotterdam	17935
" 28..	R. H. Armstrong, Newcastle, N.B.	Blankenleigm & Nolet, Rotterdam	17951
Sept. 10..	C. Curlen, Grand Falls, N.B.	John De Kuyper & Son	17966
" 12..	John M. Wiley, Fredericton	John D. Regan, St. John, N.B.	17974
" 1..	Raymond Bilodeau, Levis, Que.	Carriere et fils, Levis	24511
" 16..	Victor Lefebvre, Lachute	Nap. Carriere, Lachute	24521
Aug. 18..	J. Colas, Montreal	L. A. Wilson & Co., Montreal.	21321
" 18..	Desjardin & Co., Montreal	D. Lariviere & Co., Montreal	21322
" 18..	T. N. Laganière, Montreal	L. Chaput, fils & Co., Montreal	21326
" 18..	Mrs. D. Racine, Montreal	L. D. Wilson & Co	21333
" 20..	Mrs. M. Murphy, Montreal	Blended by vendor	21338
" 20..	Alex. Boiron, Montreal	Boivin, Wilson & Co	21345
" 21..	A. U. Monast, Montreal	A. Robitaille, Montreal	21352
" 21..	P. N. Thibault, Montreal	Hudon, Hebert & Co., Montreal	21355
" 22..	E. Menard, Montreal.	Boivin, Wilson & Co	21359
" 31..	E. Halliday, Kingston		21444
Sept. 2..	D. Smith, Hamilton		23202
" 2..	Hazell & Sons, Hamilton	Bottled by vendors	23206
" 3..	E. Morgan, Toronto	Kept on draught	23214
" 1..	Wm. Metcalfe, Berlin	Bordin & Watson, Montreal	22143
Aug. 28..	G. Arial	Richard & Co., Winnipeg	23710
" 29..	Richard & Co., Winnipeg	John De Kuyper, Holland	23711
			21441

NOTES.—All the above samples of gin, excepting No. 23710, gave distinct reactions for furfurol and a (Great Britain) fixed the minimum limit of spirit strength for gin at 65 per cent of proof. This is the examined for alkaloids. No alkaloids have been found in any sample. The average spirit strength found spirit strength is 47 70 per cent of proof.

SESSIONAL PAPER No. 14

Tabulated Statement.

Result of Analysis.

Specific Gravity	Spirit Gravity	Difference.	Solids Parts per 1000.	Alcohol. Weight.	Alcohol. Volume	Proof Spirit.	Observations.
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	
·9262	·9257	·0005	0·12	46·59	54·33	95·22	
·9443	·9436	·0007	0·14	42·95	50·52	88·53	
·9326	·9316	·0010	0·60	43·90	51·53	90·30	
·9476	·9473	·0003	0·10	35·85	42·78	74·97	
·9420	·9418	·0002	0·06	38·89	46·14	80·86	
·9445	·9436	·0009	0·88	37·89	45·04	78·93	
·9225	·9222	·0003	0·36	48·18	55·97	98·09	
·9217	·9214	·0003	0·10	48·55	56·35	98·75	
·9527	·9521	·0006	1·14	33·41	40·07	70·23	
·9506	·9501	·0005	0·16	34·48	41·26	72·31	
·9660	·9656	·0004	0·24	24·69	30·04	52·64	Below British standard strength in alcohol.
·9545	·9540	·0005	0·20	32·25	38·75	67·92	
·9615	·9613	·0002	0·38	27·71	33·56	58·82	" " "
·9550	·9544	·0006	0·38	32·00	38·47	67·42	
·9595	·9591	·0004	0·18	29·13	35·20	61·69	" " "
·9682	·9679	·0003	0·12	22·92	27·95	48·98	Much " " "
·9691	·9687	·0004	0·20	22·31	27·22	47·70	" " " "
·9573	·9570	·0003	0·36	30·44	36·70	64·32	
·9664	·9660	·0004	0·24	23·92	29·13	51·00	" " " "
·9350	·9342	·0008	0·22	42·67	50·21	88·00	
·9338	·9336	·0002	0·14	42·95	50·52	88·53	
·9336	·9320	·0016	1·34	43·71	51·32	89·95	
·9500	·9491	·0009	0·40	34·95	41·79	73·24	
·9429	·9426	·0003	0·20	38·44	45·65	80·00	
·9789	·9676	·0113	30·16	23·15	28·22	49·46	'Old Tom Gin,' below British standard in alcohol.
·9326	·9316	·0010	0·64	43·90	51·53	90·30	
·9475	·9470	·0005	0·12	36·00	42·95	75·26	

turbidity (opalescence) on dilution of the distillate with water. The Sale of Food Amendment Act of 1879 standard referred to in the marginal notes. All samples below 65 per cent of spirit strength have been for 27 samples of gin is 74·97 per cent. The highest spirit strength is 98·91 per cent of proof. The lowest

INSPECTION OF RUM—

Date of Collection	Nature of Sample.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher.	Number of Sample.
Aug. 22	Jamaica Rum	G. E. Hughes, Charlottetown	L. A. Wilson, Montreal	4356
" 27	Demerara Rum	M. J. Foley, Souris, P.E.I	R. Sullivan & Co., St. John, N.B.	4366
Sept. 8	"	Kelley & Glassey, Halifax, N.S.	Sanback & Parker, Demerara, B.W.I.	20336
" 9	Jamaica Rum	P. Donahue & Sons "	Unknown	20342
" 11	Demerara Rum	A. L. Miller "	"	20349
" 21	"	M. H. Townsend, Kentville, N.S	T. F. Courtney, Halifax	20384
" 22	"Golden Glow," Jamaica Rum	John D. Regan, St. John, N.B.	J. Brown & Co., London, Eng.	17936
" 2		M. Thibaudeau, Quebec	Ledroit Frères, Quebec	24514
" 3	Rum	Hardmarsh & Martin, Nanaimo, B.C.	Pither & Leiser, Victoria, B.C.	23580
" 3	"	J. Mahrer, Nanaimo, B.C.	J. D. Watson & Co., Dundee, Scot.	23583
" 4	"	Mrs. Stevens, Ladysmith	Hudson Bay Co., Victoria, B.C.	23585
	"	Reuben Elley, New Westminster	" Vancouver	23591

NOTE.—All the above samples of rum gave reaction for furfurol; and the distillates, on dilution with water, became distinctly opalescent.

The average strength for 12 samples of rum is 97·14 per cent. of proof spirit.

The average amount of solid matter in solution is 6·53 grammes per litre, or 0·653 per cent (weight in volume).

SESSIONAL PAPER No. 14

Tabulated Statement.

Result of Analysis.

Specific Gravity of Sample.	Spirit Gravity.	Difference	Solids in Solution.	Alcohol.		Proof Spirit.	Observations.
				Weight.	Volume.		
			p. c.	p. c.	p. c.	p. c.	
·9526	·9509	·0017	3·30	34·10	40·84	71·58	Lowest spirit strength found.
·9392	·9364	·0028	4·74	41·60	49·07	86·00	
·9363	·9332	·0031	9·06	43·14	50·72	88·88	
·9380	·9362	·0018	5·74	41·70	49·18	86·18	
·9480	·9450	·0030	5·88	37·11	44·18	77·42	
·9247	·9232	·0015	3·74	47·73	55·51	97·27	
·9407	·9382	·0025	6·18	40·70	48·10	84·30	
·8933	·8878	·0055	12·08	63·35	70·85	124·16	
·8991	·8966	·0025	7·00	59·57	67·28	117·90	
·8812	·8773	·0039	6·00	67·83	74·97	131·38	Highest "
·9322	·9297	·0025	5·20	44·77	52·44	91·90	
·9145	·9112	·0033	9·42	53·04	60·89	106·71	

The maximum solids = 12·08 grammes per litre.
The minimum " = 3·30 "
This solid matter is chiefly caramelized sugar.

INSPECTION OF BRANDY—

Date of Collection	Nature of Sample.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher.	Number of Sample.
Aug. 21	Brandy	Byrne Bros., Charlottetown	Archambeaud Freres, France	4352
" 21		A. W. Reddin "	Cognac Distillery Assn. "	4357
Sept. 8		Kelley & Glassey, Halifax	Rouger Guillet & Co. "	20338
" 9		Dillon Bros. "	Gerrard & Co. "	20341
" 11		G. Verdi "	Unknown	20348
Aug. 21		C. N. Beale & Co., North Wharf, St. John.	Boutelleau & Co., Barbezein near Cognac, France.	17933
" 29		Henry White, Bathurst, N.B.	Meagher Bros. & Co., Montreal	17955
Sept. 11		J. E. Sheasgreen, Woodstock, N.B	Evans Sons & Co., Ltd. "	17970
Aug. 31		J. N. Anctil, Rivière du Loup	L. A. Wilson "	24504
" 31		N. Fournier, Montmagny	Carrière & fils, Lévis, Que.	24509
Sept. 2		A. Parent, Quebec	J. Baillargeon, Quebec	24515
" 5		J. R. Roy, Coaticook	Walker	24519
		C. E. Laflamme, St. Jérôme	L. Chaput et fils, Montreal	24523
Aug. 18		Mrs. A. Racine, 99 St. Paul St., Montreal.	L. A. Wilson & Co. "	21332
" 21		Joseph Boyer, 133 St. Dominique, Montreal.	F. X. St. Charles "	21347
" 31		Rigney & Hickey, Kingston	Bottled by vendor	21452
" 31		T. H. Pelon, Kingston	" "	21455
Sept. 2		Chas. Schwenger, Hamilton	Not given	23204
" 3		C. E. Vardon, 543 Queen East, Toronto.	Kept on draught	23215
" 3		T. Reynolds, 837 "	"	23219
Aug. 24		A. Munroe & Co., Brandon, Man	Champane Vineyard, Boutelleau, France.	17493
" 29		W. J. Sherman, Winnipeg		23712
" 25		C. Johnston, Vancouver, B.C.	Pither & Leiser, Victoria	23553
" 25		Jos. Nauthwell, Nanaimo	" "	23579
Sept. 4		John Tha, Ladysmith, B.C.	Did not know	23584
" 6		J. E. Hughes, New Westminster.	H. Freeman, New Westminster	23588
		The following samples were purchased in Ottawa, Oct. 27, 1903.		
	One Star	Bate & Co.	Own bottling	
	Three Stars	"	"	
	V.O.	"	J. Hennessy & Co.	
	V.S.O.P.	"	J. F. Martell	

NOTES:—

In 30 samples of brandy the highest alcohol found is 106·23 per cent proof spirit; the lowest is 60·66 per cent proof spirit.

The average spirit strength is 77·62 per cent.

Only 5 samples fall below 75 per cent of proof spirit, and only 2 samples below 70 per cent.

SESSIONAL PAPER No. 14

Tabulated Statement.

Specific Gravity of Sample.	Spirit Gravity.	Difference.	Solids of Solution	Alcohol.		Proof Spirit.	Furfurol reaction.	Opalescence dilution of distillate.
				Weight.	Volume			
			p. c.	p. c.	p. c.	p. c.		
·9412	·9355	·0057	15·54	42·05	49·55	86·84	Decided	Decided.
·9169	·9156	·0013	2·72	51·13	58·97	103·34	"	"
·9378	·9332	·0046	12·40	43·14	50·72	88·88		
·9452	·9432	·0020	5·44	38·11	45·28	79·36	Faint	Faint.
·9547	·9539	·0008	3·28	32·31	38·82	68·04	"	"
·9240	·9204	·0036	13·22	49·00	56·82	99·57	Decided	Decided.
·9609	·9599	·0010	3·14	28·62	34·61	60·66	"	"
·9506	·9491	·0015	4·10	34·95	41·79	73·24	Faint	Faint.
·9212	·9188	·0024	5·04	49·73	57·54	100·85	Decided	Decided.
·9387	·9308	·0079	16·84	44·27	51·91	90·98	"	"
·9338	·9302	·0038	10·52	44·55	52·20	91·48	"	"
·9322	·9289	·0033	15·32	45·14	52·82	92·56	Faint	Faint.
9201	·9172	·0029	11·80	50·43	58·28	102·12	"	"
9512	·9489	·0023	4·52	35·05	41·90	73·43	Decided	"
·9398	9366	·0032	4·76	41·50	48 97	85·81	Faint	"
9211	·9187	·0024	9·80	49·77	57·59	100·93	Decided	Decided.
9153	·9118	·0035	11·66	52·77	60·61	106·23	"	"
·9180	·9147	·0033	10·04	51·50	59 34	104·00	Faint	Faint.
·9257	·9181	·0076	24 16	50 04	57·88	101 43	Decided	Decided.
·9516	·9509	·0007	3 06	34·10	40 84	71·58	Faint	None.
9405	·9370	·0035	4·66	41 30	48·75	85·43	"	Faint.
·9223	·9168	·0055	20·56	50·61	58 45	102·43	Decided	Decided.
·9263	·9245	0018	5·56	47 14	54·90	96 21	Faint	Faint.
·9231	·9208	·0025	7·28	48·82	56·63	99 24	Decided	Decided.
·9481	·9457	·0024	6·56	36 72	43 75	76·67		
·9436	·9355	·0075	21·18	42·05	49 55	86 84	"	"
·9491	·9473	·0018	2·70	35·85	42·78	74 97	Faint	Faint.
·9461	·9436	·0025	4·76	37·89	45·04	78·93	Decided	Decided.
·9394	·9366	·0028	8·72	41·50	48·97	85·81	"	"
·9388	·9349	·0039	8·07	42·33	49 86	87·37	"	"

The solid matter amounts to 20 grammes per litre in 3 samples.
" " " 15 " " 3 "
" " " 10 " " 6 "
" " " 5 " " 8 "
" " is less than 5 " " 10 "

APPENDIX G.

BULLETIN No. 93--MILK, 1903.

OTTAWA, February 3, 1904.

W. J. GERALD, Esq.,
Deputy Minister of Inland Revenue.

SIR,—I beg to submit herewith a tabulated statement giving the results of examining 227 samples of milk collected, in accordance with your instructions, in the months of November and December, 1903. The statement gives full particulars regarding the origin of each sample. Three of them were found on analysis to contain over 6 per cent of butter fat and were therefore regarded as 'partly cream.' Deducting these, the remaining 224 samples may, according to their qualities, be classified as follows:—

Genuine or unadulterated	159
Watered	15
Skimmed	2
Partly skimmed	6
Under average in total solids	9
" " butter fat	13
" " non-fatty solids	20
Total	224

When compared with former collections, the one now being reported shows about the same relative proportions of the various qualities as in 1895, and an improvement over the collections of 1897 and 1901.

The figures are as follows :—

	November and December, 1895.	September and October, 1897.	September and October, 1901.	November and December, 1903.
	Per cent.	Per cent.	Per cent.	Per cent.
Genuine	70·8	65·0	63·7	70·9
Watered	4·2	4·4	1·3	6·7
Skimmed	.....	.....	0·6	0·9
Partly skimmed	2·7	6·6	2·5	2·7
Under average	22·3	24·0	31·9	18·8
	100·0	100·0	100·0	100·0

The following table shows where the samples were obtained, and their qualities in each place:—

Locality.	Genuine.	Watered.	Skimmed.	Partly Skimmed.	Under Average.	Total.
Halifax, N.S.	10	0	0	0	4	14
Springhill	2	0	0	0	2	4
Amherst	1	0	0	0	0	1
Truro	2	0	0	0	1	3
Dartmouth	1	1	0	0	0	2
Charlottetown, P.E.I.	7	0	0	0	2	9
Summerside	1	0	0	0	1	2
St. John, N.B.	10	1	0	0	2	13
Sussex	1	0	0	1	0	2
Campbellton	2	0	0	0	1	3
Moncton	2	0	0	0	2	4
St. Hyacinthe, P.Q.	6	0	0	0	0	6
Drummondville	3	0	0	0	0	3
Actonvale	1	0	0	0	1	2
Richmond	1	0	0	0	1	2
Victoriaville	2	0	0	0	0	2
Sherbrooke	3	1	0	0	0	4
Farnham	1	0	0	0	0	1
Granby	2	0	0	0	0	2
Sutton	1	0	0	0	0	1
St. Lambert	2	0	0	0	2	4
Montreal	18	1	0	2	3	24
Kingston, Ont	9	2	0	0	1	12
Perth	3	0	0	0	0	3
Ottawa	10	0	0	1	0	11
Toronto	11	4	0	0	3	18
Hamilton	4	0	0	0	2	6
Goderich	3	0	0	0	0	3
Seaforth	3	0	0	0	0	3
Stratford	2	0	0	0	1	3
London	5	0	0	0	0	5
St. Thomas	2	0	0	0	2	4
Woodstock	2	1	0	0	0	3
Virden, Man.	1	0	0	0	0	1
Brandon	1	0	0	1	2	4
Winnipeg	8	2	2	0	1	13
Ponoka Alta.	0	0	0	0	1	1
Wetaskiwin	0	0	0	0	1	1
Edmonton	2	0	0	0	1	3
Calgary	1	0	0	1	2	4
Vancouver, B.C.	4	1	0	0	1	6
New Westminster	2	0	0	0	1	3
Victoria	4	1	0	0	1	6
Nanaimo	3	0	0	0	0	3
	159	15	2	6	42	224

If a comparison be made between the collections of 1895, 1897 and 1903 by localities, and the percentages of genuine samples calculated for those places in which samples were taken on all these occasions, the following results are obtained:—

PERCENTAGE OF GENUINE SAMPLES.

—	1895.	1897.	1903.	—	1895.	1897.	1903.
	Per cent.	Per cent.	Per cent.		Per cent.	Per cent.	Per cent.
Halifax, N.S.	66·6	75·0	71·4	St. Hyacinthe	100·0	100·0	100·0
St. John, N.B.	31·3	91·0	76·9	Ottawa, Ont.	62·5	64·3	90·9
Sussex	33·3	100·0	50·0	Toronto	50·0	31·2	61·1
Moncton	100·0	66·6	50·0	London	66·6	77·7	100·0
Sherbrooke, P.Q.	100·0	50·0	75·0	Stratford	100·0	100·0	66·6
Montreal	72·7	68·7	75·0	St. Thomas	100·0	50·0	50·0
				Winnipeg, Man.	72·2	73·7	61·0

I have the honour to be, sir, your obedient servant,

THOMAS MACFARLANE, *Chief Analyst.*

TABULATED STATEMENT of the

Date of Collection.	No. of Sample.	Name and Address of Analyst.	Quantity.	Cost.	Name and Address of Furnisher.
1903.		*District of Halifax.*		S cts.	
Nov. 19..	20391	C. W. Drysdale, Halifax, N.S	1 pint	0 05	Brought into city by train daily—Unknown.
" 19..	20392	Scotia Pure Milk Co. "	1 "	0 05	L. Mumford, Shediac
" 19..	20393	" "	1 "		P. Grant, Lower Stewiacke
" 19..	20394	" "	1 "		J. J. Gourley "
" 19..	20395	J. S. Power "	1 "	0 03	H. Grant, Halifax
" 19..	20396	James Hogan "	1 "	0 03	C. W. Drysdale, Halifax
" 19..	20397	Wm. Forsyth "	1 "	0 03	Wm. Smith, Halifax. Brought into city by train.
" 19..	20398	" "	1 "	0 03	Scotia Pure Milk Co., City. Sold as pasteurized milk.
" 20..	20399	Scotia Pure Milk Co. "	1 "	0 03	Scotia Pure Milk Co
" 20..	20400	H. Burgess "	1 "	0 03	Brought into city by train and taken from delivery wagon.
" 20..	20401	G. A. Fraser "	1 "	0 03	" "
" 20..	20402	W. C. Mountain "	1 "	0 04	Jas. Mountain, Halifax
" 20..	20403	P. Lowrie "	1 "	0 04	Jas. Murray "
" 20..	20404	Walter Payne "	1 "	0 03	Scotia Pure Milk Co., Halifax
" 20..	20405	E. A. Bent, Springhill, N.S.	1 "	0 03	Vendor
" 20..	20406	James Nelson "	1 "	0 03	"
" 26..	20407	R. Boss "	1 "	0 03	"
" 26..	20408	Frank Mills "	1 "	0 03	"
" 26..	20411	H. E. Miner, Restaurantkeeper, Amherst, N.S.	1 "	0 05	M. Pipes, Amherst
" 27..	20412	L. R. Dunlop, Truro, N.S.	1 "	0 03	Vendor
" 27	20413	W. H. Snook & Co., Shopkeeper, Truro, N.S.	1 "	0 03	L. R. Dunlop, Truro
" 27..	20414	G. H. Barnhill, Truro, N.S.	1 "	0 03	Vendor
" 30..	20417	Frank Dare, Dartmouth, N.S.	1 "	0 03	Pure Milk Co., Halifax (pasteurized)
" 30..	20418	Mrs. Griffin, Shopkeeper, Dartmouth, N.S.	1 "	0 03	Geo. Bell, Coal Harbour.
		District of Prince Edward Island.			
Dec. 2..	4375	Victor Mackinnon, Charlottetown, P.E.I.	1 "	0 03	Vendor
" 2..	4376	Roger Farquharson, Charlottetown, P.E.I.	1 "	0 03	"
" 2..	4377	A. McMillan, Brackley Point Road.	1 "	0 03	"
" 2..	4378	Wallace Wheatley, Royalty	1 "	0 03	"
" 2..	4379	M. Matheson, St. Peter's Road	1 "	0 03	"
" 2..	4380	James Pickard, Royalty, P.E.I.	1 "	0 03	"
" 2..	4381	Wm. Millar, Marshfield	1 "	0 03	"
" 2..	4382	J. M. Price, Summerside	1 "	0 03	"
" 2..	4383	Joseph McNeill "	1 "	0 03	"
" 2..	4384	Wm. Pickering "	1 "	0 03	"
" 2.	4386	E. Cameron, Charlottetown.	1 "	0 03	J. Roper, Charlottetown, P.E.I.
" 2..	4387	" "	1 "	0 03	Donald McMillen "
		District of New Brunswick.			
Nov. 18..	17976	Fred. Hanna, Milledgeville, N.B.	3 8-oz bottles.	0 06	Vendor
" 18..	17977	Dunlop & Croakes, 24 St. Germain St., St. John.	"	0 06	Stanley Ward, St. John North.
" 18..	17978	E. Foster, Milledgeville Road, St. John Co.	"	0 06	Vendor
" 18..	17979	Harry M. Floyd, 38 Sydney St., St. John, N.B.	"	0 06	McIntyre Bros., Sussex, N.B

Inspection of Whole Milk.

Specific Gravity at 15° C.	Water.	Butter Fat.	Other Solids.	Total Solids.	Analyst.	Remarks by the Analyst.
	Result of Analysis.					
	p. c.	p. c.	p. c.	p. c.		
1·0300	88·15	3·83	8·03	11·85	M. Bowman	Below average in solids not fat.
1·0317	86·83	4·31	8·86	13·17	"	Genuine.
1·0307	88·45	3·26	8·29	11·55	"	Below average in butter fat.
1·0303	86·93	4·63	8·44	13·07	"	Genuine.
1·0302	88·15	3·29	8·56	11·85	"	Below average in butter fat.
1·0302	88·73	3·11	8·16	11·27	"	" " and other solids.
1·0334	86·63	4·15	9·12	13·37	"	Genuine.
1·0314	87·32	3·98	8·70	12·68	"	"
1·0310	87·48	4·02	8·50	12·52	"	"
1·0295	87·62	4·03	8·35	12·38	"	"
1·0304	87·74	3·75	8·51	12·26	"	"
1·0319	87·69	3·52	8·79	12·31	"	"
1·0310	86·92	4·48	8·60	13·08	"	"
1·0308	87·55	3·95	8·50	12·45	"	"
1·0308	86·46	4·76	8·75	13·54	"	"
1·0333	84·81	5·70	9·47	15·19	"	"
1·0292	88·38	3·68	7·94	11·62	"	Below average in solids not fat.
1·0288	87·99	4·02	7·99	12·01	"	" "
1·0323	86·96	4·31	8·73	13·04	"	Genuine.
1·0323	86·60	5·03	8·97	14·00	"	"
1·0320	88·21	3·30	8·40	11·79	"	Below average in butter fat.
1·0327	86·59	4·46	8·95	13·41	"	Genuine.
1·0310	87·41	3·98	8·61	12·59	"	"
1·0237	89·86	3·38	6·76	10·14	"	Watered and therefore adulterated.
1·0296	87·46	4·14	8·40	12·54	T. Macfarlane	Genuine.
1·0334	88·16	3·67	8·17	11·84	"	Under average in total solids.
1·0324	86·60	4·77	8·63	13·40	"	Genuine.
1·0324	87·05	4·55	8·40	12·95	"	"
1·0314	87·40	4·20	8·40	12·60	"	"
1·0314	86·35	5·03	8·62	13·65	"	"
1·0304	87·46	4·40	8·14	12·54	"	Underaverage in non-fatty solids.
1·0324	88·70	3·37	7·93	11·30	"	Under average in total solids.
1·0327	87·78	3·69	8·53	12·22	"	Genuine.
1·0327	84·89	6·36	8·75	15·11	"	Partly cream.
1·0327	87·04	4·26	8·70	12·96	"	Genuine.
1·0327	87·05	4·28	8·67	12·95	"	"
1·0224	90·61	3·16	6·23	9·39	J. G. A. Valin	Watered, therefore adulterated.
1·0324	86·82	4·13	9·05	13·18	"	Genuine.
1·0344	87·17	3·51	9·32	12·83	"	"
1·0324	87·49	3·55	8·96	12·51	"	"

TABULATED STATEMENT of the

Date of Collection.	No. of Sample.	Name and Address of Vendor.	Quantity.	Cost.	Name and Address of Furnisher.
		District of New Brunswick—Con.		$ c.	
Nov. 19..	17980	E. A. McCauley, 173 Princess St., St. John.	8-oz. bottles.	0 05	C. B. McCready, Apohaqui, N.B..
" 19..	17981	T. Robinson, 39 Garden St., St. John, N.B.	" ..	0 05	Robert Robinson, Sussex, N. B....
" 19..	17982	D. M. Lawson, 182 Britain St...	" ..	0 05	J. A. Patterson, Apohaqui, N.B...
" 19..	17983	R. W. Wigmore, 158 Pond St., St. John.	" ..	0 05	Sussex Milk and Cream Co., Sussex, N.B.
" 19..	17984	Public Hospital, Waterloo St., Thos. H. Lunney, M.D., St. John, N. B.	" ..	Nil..	A. E. McCauley, St. John, N.B...
" 20..	17985	J. H. Case, 24 Waterloo St., Halifax.	" ..	0 06	S. Creighton, Silver Falls, N.B....
" 20..	17986	Jas. W. Brogan, 16 Brussels St., St. John.	" ..	0 06	Andrew Gibson, Red Head, N.B ..
" 26..	17990	Major H. Green, Milledgeville Road, St. John, N.B.	" ..	0 06	From vendor's dairy .. ..
" 26..	17991	Thompson Bros., Manawagonish Road, Lancaster Parish, St. John Co.	" ..	0 06	" .....
Dec. 7..	17992	Sussex Milk Co., Sussex, King's Co., at Milk Depot, Broad St., James Lamb, manager.	" .	0 06	Hugh Aiton, Sussex Corner, Sussex Co.
" 7 .	17993	" " ..	" ..	0 06	David Robinson, Sussex, King's Co.
" 7..	17994	" " .	" ..	0 06	David Aiton, Lower Cove, Sussex, King's Co.
" 7.	17995	Thos. R. Duncan, Campbellton..	" ..	0 05	Vendor..... .....
" 7..	17996	A. F. Chamberlain " ..	" ..	0 05	" ....
" 7.	17997	Angus McKenzie " ..	" ..	0 05	John Mair, Campbellton . .. .
" 7..	17998	David W. Doherty " ..	" ..	0 06	Vendor..... .. ..
" 12..	23801	Albert J. Steeves, Bridgedale.. .	" ..	0 05	" ....
" 12..	23802	F. H. Trites, Sunnybrae.	" ..	0 05	" ....
" 12..	23803	E. H. Hopper, Shediac Road, Moncton, N.B.	" ..	0 05	" . ...
" 12..	23804	Beaton & Co., City Market, Moncton, N.B.	" ..	0 10	Gurney R. Jones, Lewisville, Moncton Parish.
		District of Quebec.			
Nov. 23..	24701	Louis Carrière, 72 St. Pascal St., St. Hyacinthe.	1 pint..	0 03	....
" 23..	24702	Pierre Sabourin, St. Hyacinthe le Confesseur.	" ..	0 03	....
" 23..	24704	Amb. Chinette, St. Hyacinthe...	" ..	0 03	....
" 23..	24705	F. X. Blanchard, St. Hyacinthe le Confesseur.	" ..	0 03	....
" 23..	24703	P. Labonte, St. Hyacinthe.....	" ..	0 04	Jacques Boulay, St. Thomas d'Aquin
" 23..	24706	J. B. Laplante "	" ..	0 03	....
" 23..	24707	M. Cardin, Drummondville.....	" ..	0 03	....
" 23..	24708	R. Cardin "	" ..	0 03	... .
" 23..	24709	X. Lemaire "	" ..	0 03	....
" 23..	24710	L. Lajoie, Actonvale	" ..	0 03	....
" 23..	24711	Laurent Plante, Actonvale	" .	0 03	... .
" 25..	24712	C. N. Evans, Richmond..... ...	" ..	0 03	....
" 25.	24713	W. H. McLaughlin, Richmond..	" ..	0 03	.. ..
" 25..	24714	Amedé Mathieu, St. Victoire, d'Arthabaska.	" ..	0 04	....
" 25..	24715	Joseph Dussault, Victoriaville...	" .	0 03	....
" 25 .	24716	Felix Vanier, Sherbrooke.....	" ..	0 03	....
" 25	24717	Richard Armitage, Sherbrooke...	" .	0 03	... .
" 25..	24718	David Lefebvre, 3rd Concession of Sherbrooke.	" ..	0 03	....
" 25 .	24719	W. J. Hunt, Sherbrooke.....	" ..	0 05	J. W. Bilton, Sherbrooke..... ....

SESSIONAL PAPER No. 14

Inspection of Whole Milk.

Result of Analysis

Specific Gravity at 15.5 C.	Water.	Butter Fat.	Other Solids.	Total Solids.	Analyst.	Remarks by the Analyst.
	p. c.	p. c.	p. c.	p. c.		
1·0324	87·23	3·53	9·24	12·77	J. G. A. Valin	Genuine.
1·0314	86·26	4·38	9·36	13·74	"	"
1·0324	87·59	3·20	9·21	12·41	"	Under average in butter fat.
1·0327	87·43	3·77	8·80	12·57	"	Genuine.
1·0342	86·98	4·04	8·98	13·02	"	"
1·0322	85·66	4·73	9·61	14·34	"	"
1·0322	87·80	3·38	8·72	12·20	"	Under average in butter fat.
1·0316	87·69	3·67	8·64	12·31	A. Lemoine	Genuine.
1·0326	87·28	3·71	9·01	12·72	"	"
1·0326	88·44	2·43	9·13	11·56	Miss S. E. Wright	Partly skimmed, therefore adulterated.
1·0306	84·51	6·24	9·25	15·49		Partly cream.
1·0306	85·56	5·00	9·44	14·44		Genuine.
1·0272	84·55	6·99	8·46	15·45		Partly cream.
1·0322	86·40	4·43	9·17	13·60		Genuine.
1·0292	88·20	3·71	8·09	11·80		Under average in total solids.
1·0292	86·59	5·24	8·17	13·41		Genuine.
1·0272	88·03	4·14	7·83	11·97		Under average in non-fatty solids.
1·0252	88·37	4·49	7·14	11·63		"
1·0302	86·83	4·50	8·67	13·17		Genuine.
1·0252	86·90	4·49	8·61	13·10		"
1·0328	86·98	4·06	8·96	13·02	J. G. A. Valin	Genuine.
1·0335	86·60	4·27	9·13	13·40	"	"
1·0305	86·24	4·72	8·94	13·66	Miss S. E. Wright	"
1·0295	86·26	4·50	9·14	13·64	"	"
1·0305	86·61	4·22	9·07	13·29	"	"
1·0316	86·94	3·74	9·22	12·96	"	"
1·0254	87·11	4·48	8·35	12·79	"	"
1·0285	86·65	4·24	9·01	13·25	"	"
1·0285	84·86	4·80	10·24	15·04	"	"
1·0295	85·98	4·85	9·09	13·92	"	"
1·0305	87·96	3·20	8·74	11·94	"	Under average in butter fat.
1·0295	88·26	3·16	8·48	11·64	"	"
1·0285	87·03	3·98	8·89	12·87	"	Genuine.
1·0316	85·93	4·54	9·43	13·97	"	"
1·0326	86·05	3·97	9·88	13·85	"	"
1·0204	91·17	3·03	5·70	8·73	"	Watered, therefore adulterated.
1·0305	87·04	3·85	9·01	12·86	"	Genuine.
1·0295	86·08	4·67	9·15	13·82	"	"
1·0316	86·31	4·21	9·38	13·59	"	"

TABULATED STATEMENT of the

Date of Collection.	No. of Sample.	Name and Address of Vendor.	Quantity.	Cost.	Name and Address of Furnisher.
		District of Quebec—Continued.		8 cts.	
Dec. 1..	24720	Alf. Guerin, Farnham.....	1 pint..	0 03	Vendor.. ....
" 1..	24721	F. W. Roberts, Granby.....	1 " ..	0 03	" . ...
" 2.	24722	T. Arrowsmith, Granby.....	1 " ..	0 03	" . . ..
" 2..	24723	A. A. Robinson, Sutton....	1 " ..	0 03	" ....
" 3..	24724	J. Smith, St. Lambert	1 " ..	0 04	" .....
" 7..	24725	E. C. Holland, St. Lambert.....	1 " ..	0 04	" ....
" 7	24726	M. St. Yves, St. Lambert. ...	1 " ..	0 04	" ....
" 7	24727	P. St. Marie, St. Lambert.. ..	1 " ..	0 04	" ....
		District of Montreal.			
Nov. 18..	23464	L. Dussault, 317 Delisle St., St. Cunegonde.	1 " ..	0 05	....
" 18..	23465	G. G. Lyster, 146 Mountain St., Montreal.	1 " ..	0 04	J. S. Lyster, Richmond, Que.. ...
" 18..	23466	Park Bros., Montreal West... .	1 " ..	0 04	....
" 18..	23467	Luke Prudhomme, Côte St. Luc	1 " ..	0 04	....
" 18..	23468	Geo. Smith, 14 Laurier St., St. Henri.	1 " ..	0 04	J. Smiley, Richmond, Que.. . ...
" 18 .	23469	W. F. Little, 17 Plateau St., Montreal.	1 " ..	0 04	Geo. Biggar, Huntingdon .....
" 18 .	23470	A. Papineau, 64 Turgeon St., S . Henri.	1 " ..	0 04	....
" 18 .	23471	James Clarke. 4 Atwater Ave., St. Henri.	1 " ..	0 04	.. ..
" 18..	23472	Louis Geoffrion, 196 Richelieu St., St. Cunegonde.	1 " ..	0 04	....
" 18..	23473	A. Messier, 292 Delisle St., St. Cunegonde.	1 " ..	0 04	... .
" 20..	23474	H. W. Evans, Blue Bonnets.....	1 " ..	0 04	Taken at office of vendor as ready for sale, put up in pint bottles.
" 20..	23475	Standard Dairy Co., 671 Lagauchetière St., Montreal.	1 " ..	0 04	Taken on street from can in vendor's wagon.
" 20..	23476	J. B. Thompson, Petit Cote.. ...	1 " ..	0 04	" "
" 20..	23477	James Muir, St. Laurent.	1 " ..	0 04	" "
" 20 .	23478	Guaranteed Pure Milk Co., St. Catherine St., Montreal.	1 " ..	0 04	" "
" 20..	23479	Geo. Duncan, 35 Selby St., Westmount.	1 " ..	0 04	" "
" 20..	23480	Thos. Couray, Hillside Avenue, Westmount.	1 " ..	0 04	" "
" 20..	23481	L. Lariviere, Cartierville..... .	1 " ..	0 04	" "
" 20..	23482	Geo. H. Brown, 11 Broche Ave., Westmount.	1 " ..	0 04	" "
" 20..	23483	J. P. Côté, 532 St. Dominique St., Montreal.	1 " ..	0 04	... .
" 20..	23484	Standard Dairy Co., 671 Lagauchetière St., Montreal.	1 " ..	0 04	T. E. Booth, Waterloo St..... ....
" 20..	23485	Guaranteed Pure Milk Co., Montreal.	1 " ..	0 04	C. S. Campbell, Dorval .. ..
" 20..	23486	" " 1	" ..	0 04	R. R. Ness, Howick... .....
" 20..	23487	" " 1	" ..	0 04	....
		District of Kingston.			
Nov. 25..	21456	The Clarified Milk Co., Kingston	1 " ..	0 05	Taken from wagon on street while delivering.
" 25..	21457	T. McQuay, Kingston Junction..	1 " ..	0 05	" "
" 25..	21458	J. G. Porter, Cataraqui.....	1 " ..	0 05	....
" 25.	21459	O. McMichael, Cataraqui	1 " ..	0 05	.. ..

SESSIONAL PAPER No. 14

Inspection of Whole Milk—*Continued.*

	Result of Analysis.					
Specific Gravity at 15°c.	Water.	Butter Fat.	Other Solids.	Total Solids.	Analyst.	Remarks by the Analyst.
	p. c.	p. c.	p. c.	p. c.		
1·0316	86·74	4·48	8·78	13·26	A. Lemoine.	Genuine.
1·0324	87·22	3·97	8·81	12·78	T. Macfarlane	"
1·0334	86·45	4·36	9·19	13·55	"	"
1·0334	86·61	4·20	9·19	13·39	"	"
1·0327	87·01	4·17	8·82	12·99	"	"
1·0306	88·20	3·68	8·12	11·80	"	Under average in non-fatty solids.
1·0256	87·17	5·64	7·19	12·83	"	" "
1·0347	87·21	3·65	9·14	12·79	"	Genuine.
1·0320	87·82	4·01	8·17	12·18	Dr. J. T. Donald.	"
1·0333	86·18	5·16	8·66	13·82	"	"
1·0340	88·52	3·09	8·39	11·48	"	Doubtful, under average in butter fat.
1·0363	86·17	4·52	9·31	13·83	"	Genuine.
1·0340	87·19	4·17	8·64	12·81	"	"
1·0341	87·12	4·15	8·73	12·88	"	"
1·0330	87·35	4·17	8·48	12·65	"	"
1·0338	85·93	4·34	9·73	14·07	"	"
1·0320	87·65	3·86	8·49	12·35	"	"
1·0324	87·34	4·04	8·62	12·66	"	"
1·0300	88·43	3·54	8·03	11·57	"	Low in solids not fat.
1·0311	88·10	3·87	8·03	11·90	"	Under average in solids not fat.
1·0353	88·04	2·90	9·06	11·96	"	Partly skimmed.
1·0339	87·50	3·54	8·96	12·50	"	Genuine.
1·0356	88·26	2·85	8·89	11·74	"	Partly skimmed.
1·0327	86·87	4·67	8.46	13·13	"	Genuine.
1·0332	86·82	4·03	9·15	13·18	"	"
1·0264	89·46	3·31	7·23	10·54	"	Low in solids and fat, probably watered.
1·0345	87·21	3·84	8·95	12·79	"	Genuine.
1·0340	86·76	4·37	8·93	13·30	"	"
1·0300	86·92	4·61	8·47	13·08	"	"
1·0320	87·19	4·11	8·70	12·81	"	"
1·0332	87·14	3·89	8·97	12·86	"	"
1·0331	87·29	3·91	8·80	12·71	"	"
1·0285	89·01	3·05	7·94	10·99	Miss S. E. Wright.	Slightly watered, therefore adulterated.
1·0316	86·52	4·34	9·14	13·48	"	Genuine.
1·0254	90·24	2·64	7·12	9·76	"	Watered, therefore adulterated.
1·0295	85·92	3·90	10·18	14·08	"	Unadulterated.

TABULATED STAEMENT of the

Date of Collection.	No. of Sample.	Name and Address of Vendor.	Quantity.	Cost.	Name and Address of Furnisher.
1905.		*District of Kingston*—Continued.		cts.	
Nov 25..	21460	F. X. Theriault, Kingston Junction.	1 pint..	0 05	
" 25..	21461	E. Ferrier, Williamsville	1 " ..	0 05	
" 25..	21462	Joseph Morton, Kingston Junction.	1 " ..	0 05	
" 25..	21463	John Gillespie, Barriefield	1 " .	0 05	
" 25..	21464	A. E. Weller, Kingston Junction	1 " ..	0 05	
" 25..	21465	The Clarified Milk Co., Kingston	1 " ..	0 05	Taken from factory, in stock as supplied by W. Gardner, Perth Road.
25.	21466	" "	1 " ..	0 05	Taken at factory from a quart bottle in stock as prepared for delivery to customers.
" 25..	21467	F. P. Grass, Albert St., Kingston	1 " .	0 05	
" 26..	21468	James T. Watt, Perth, Ont	1 " .	0 05	Taken from wagon on street
" 26..	21469	John Brady, Perth	1 " ..	0 05	" " "
" 26..	21470	H. J. Chaplin, Perth	1 " ..	0 05	" " "
" 27..	21471	Wm. Warnock, Cummings Bdge, Ottawa.	1 " ..	0 05	" " "
" 27..	21472	Ottawa Dairy Co., Ottawa	1 quart.	0 06	" " " (No. 19)
" 27..	21473	R. Ormond, Cummings Bridge	1 " ..	0 03	" " "
" 27..	21474	J. Craig, Cummings Bridge.	1 pint..	0 03	" " "
" 27..	21475	Arthur Grimes, Aylmer, P.Q	1 " .	0 05	" " "
" 27..	21476	Ottawa Dairy Co., Ottawa.	1 quart.	0 06	" " " (No. 16)
" 27	21477	P. Clarke, Albert St., Ottawa	1 " ..	0 06	Taken at factory, put up in bottle ready for delivery.
" 27.	21480	Ottawa Dairy Co., Ottawa	1 pint..	0 03	Scobie & Fee, taken after clarification.
27.	21481	" " "	1 " ..	0 03	Scobie & Fee, taken before clarification.
27..	21482	" " "	1 " ..	0 03	J. McKellar, taken after clarification.
27..	21483	" " "	1 " ..	0 03	J. McKellar, taken before clarification.
		Toronto District.			
Dec. 2..	23257	Geo. Pope, 204 Victoria St., Tor.	1 pint..	0 03	Taken from wagon on street
" 2..	23258	W. Bawden, 1231 College "	1 " ..	0 03	" " "
" 2..	23259	A. Arnold, 685 Yonge "	1 " ..	0 03	" " "
" 2..	23260	Miss Flanley, 278 Church "	1 " ..	0 03	Taken at store of vendor.
" 2..	23261	John Cranston, 245 " "	1 " ..	0 03	Woburn Dairy
" 2..	23262	W. J. Campbell, 421 Yonge St., Toronto, Union Dairy Co.	1 " ..	0 03	Taken at dairy of vendor
" 2..	23263	Richard Doughty, Bedford Park, Toronto.	1 " ..	0 03	From wagon on street
" 2.	23264	Richard Doughty, Bedford Park, Toronto.	1 " ..	0 03	Vendor's farm
" 2.	23265	S. J. Peacock, 82 Power St., Tor.	1 " ..	0 03	Taken at vendor's dairy
2..	23266	S. Price & Sons, Ltd., 217 King St., E., Toronto.	1 " ..	0 03	From bottled stock
3.	23267	S. Price & Sons, Ltd., 217 King St., E., Toronto.	1 " .	0 03	James Moffatt, Wexford, before pasteurising.
" 3..	23268	A. Cowley, 289 Queen St., Toronto	1 " ..	0 03	Taken at vendor's dairy
3..	23269	James R. Hambridge, 273 Queen St., Toronto.	1 " ..	0 03	
" 3	23272	S. Price & Sons, Ltd., 217 King St. E., Toronto.	1 " ..	0 03	James Darlington, Wexford; before being pasteurized.
3.	23270	City Dairy Co., Toronto	1 " ..	0 03½	R. M. Loveless, Agincourt
3..	23271	" " "	1 " ..	0 03½	Jas. Montgomery, Streetsville.
3..	23273	" " "	1 " ..	0 03½	As the milk ran through pasteurizing machine.
3.	23274	" "	1 " ..	0 03½	As bottled ready for sale

Inspection of Whole Milk—*Continued.*

Specific Gravity at 15·6 c.	Result of Analysis. Water.	Butter Fat.	Other Solids.	Total Solids.	Analyst.	Remarks by the Analyst.
	p.c.	p.c.	p.c.	p.c.		
1·0275	88·31	3·77	7·92	11·69	Miss S. E. Wright	Under average in non-fatty solids.
1·0305	86·62	4·37	9·01	13·38	"	Genuine.
1·0295	87·55	3·71	8·74	12·45	"	"
1·0305	86·81	4·15	9·04	13·19	"	"
1·0254	86·70	4·40	8·90	13·30	"	"
1·0285	87·01	3·83	9·16	12·99	"	"
1·0275	87·84	3·75	8·41	12·16	"	"
1·0285	86·83	4·23	8·94	13·17	"	"
1·0295	87·39	3·88	8·73	12·61	"	"
1·0295	86·50	4·47	9·03	13·50	"	"
1·0295	86·74	3·89	9·36	13·25	"	"
1·0316	88·52	2·64	8·74	11·38	"	Partly skimmed, therefore adlt'd.
1·0316	87·20	3·77	8·93	12·70	"	Genuine.
1·0295	87·13	3·64	9·13	12·77	"	"
1·0285	86·05	4·58	9·27	13·85	"	"
1·0316	87·00	4·67	8·23	12·90	"	"
1·0305	87·41	3·63	8·86	12·49	"	"
1·0295	85·55	4·79	9·56	14·35	"	"
1·0295	87·05	3·89	9·06	12·95	"	"
1·0305	87·16	3·87	8·97	12·84	"	"
1·0316	87·05	3·62	9·33	12·95	"	"
1·0316	86·88	3·74	9·38	13·12	"	"
1·0290	89·46	3·25	7·19	10·44	Dr. W. H. Ellis	Adulterated by addition of water.
1·0330	87·80	3·58	8·62	12·20	"	Genuine.
1·0330	88·05	3·48	8·47	11·95	"	"
1·0290	89·83	2·55	7·62	10·17	"	Adulterated by addition of water.
1·0310	88.83	3·52	7·65	11·17	"	Under average in total solids.
1·0310	88·79	3·48	7·73	11·21	"	" " "
1·0340	86·84	4·19	8·97	13·16	"	Genuine.
1·0340	86·64	4·53	8·83	13·36	"	"
1·0280	89·53	3·01	7·46	10·47	"	Adulterated by addition of water.
1·0310	88·85	3·16	7·99	11·15	"	Under average in solids.
1·0330	87·66	3·53	8·81	12·34	"	Genuine.
1·0320	87·47	4·15	8·38	12·53	"	"
1·0300	89·20	3·14	7·66	10·80	"	Adulterated by addition of water.
1·0340	87·60	3·48	8·92	12·40	"	Genuine.
1·0340	86·97	3·99	9·04	13·03	"	"
1·0320	87·29	4·11	8·60	12·71	"	"
1·0330	87·53	3·73	8·71	12·47	"	"
1·0330	87·83	3·56	8·61	12·17	"	"

TABULATED STATEMENT of the

Date of Collection.	No. of Sample.	Name and Address of Vendor.	Quantity	Cost.	Name and Address of Furnisher.
		Toronto District—Concluded.		$ cts.	
Dec. 4	23275	D. Duncan Waterdown, Hamilton	1 "	0 03	From wagon on street
" 4	23276	J. O. Ryckman, 87 Victoria St., Hamilton.	1 "	0 03	" "
" 4	23277	Chas. Cochrane, Hamilton	1 "	0 03	" " (No. 84).
" 4	23278	G. Hamilton, 223 E. Av., Hamilton	1 "	0 03	" "
" 4	23279	Pure Milk Corporation, "	1 "	0 03	Taken on premises before being sterilized.
" 4	23280	" " "	1 "	0 03	After it has been through machine.
		London District.			
Nov. 24	22160	John Porter, Goderich	1 quart	0 06	Vendor, collected on street
" 24	22161	Samuel Bisset, "	1 "	0 06	" "
" 24	22162	John Beattie, "	1 "	0 06	" "
" 25	22163	Hugh Greeves, Tuckersmith Township, collected in Seaforth.	1 "	0 03	Vendor, bottled milk
" 25	22164	Daniel Grummet, Seaforth	1 "	0 03	" "
" 25	22165	Joseph Brown, McKillop Township, collected in Seaforth.	1 "	0 03	" "
" 30	22166	Phillip Cornish, Stratford	1 "	0 03	Collected from sleigh in Stratford
" 30	22167	R. S. Beattie, Ellis Township, Stratford P.O.	1 "	0 03	" " "
Nov. 30	22168	A. J. Clarke, Downey Township, Stratford P.O.	1 quart	0 06	Vendor, collected from milk sleigh in Stratford.
Dec. 1	22169	J. Foster & Sons, Westminster Township, London.	"	0 06	" "
" 1	22170	G. Tupholme, London	"	0 05	" "
" 1	22171	W. J. Walker "	"	0 05	" "
" 1	22172	Arthur Wilson "	"	0 05	From milk wagon on street
" 1	22173	William McKone, Albert Avenue, London.	"	0 05	" "
Nov. 30	22175	Fred Cheplow, St. Thomas			Vendor
Dec. 1	22176	J. A. Small "			"
" 1	22177	Fred. Carr "			From large can in wagon on street in St. Thomas.
" 1	22178	Simon Kelly "			" "
" 1	22179	T. H. Dent, Woodstock			Vendor
" 1	22180	John Masson "			John Speck, Woodstock, and John Dunn, East York.
" 1	22181	George Masson "			Vendor
		Winnipeg District.			
Nov. 20	23901	John Bain, Virden, Man	1 pint	0 05	
" 20	23902	G. Coombes, Brandon, Man	"	0 05	
" 20	23903	Brandon Dairy Co., Brandon, Man	"	0 05	
" 20	23904	J. White, Brandon, Man	"	0 05	
" 20	23905	Brandon Creamery Supply Co	"	0 05	
" 20	23906	C. V. Walleghen, Winnipeg, Man	"	0 05	
" 20	23907	P. Gaspas, St. Boniface, Man	"	0 05	
" 20	23908	Winnipeg Pure Milk Co	"	0 05	
" 20	23909	S. Eddleston, Winnipeg, Man	"	0 05	
" 23	23910	Wm. Cummings, Winnipeg, Man	"	0 05	
" 23	23911	A. Panquerin "	"	0 05	
" 25	23912	W. S. Craig "	"	0 05	
" 26	23913	J. Johnston "	"	0 05	
" 26	23914	A. Walleghion "	"	0 05	Vendor, Royal Dairy
" 26	23915	W. A. Spiers "	"	0 05	" Scotch Dairy
" 26	23916	Dickson Bros. "	"	0 05	" City Dairy
" 26	23917	J. Davidson, Fort Rouge	"	0 05	" Dairy
" 26	23918	Elm Park Dairy, Winnipeg, Man	"	0 05	

Inspection of Whole Milk—*Continued.*

Specific Gravity at 15·5 c.	Water.	Butter Fat.	Other Solids.	Total Solids.	Analyst.	Remarks by the Analyst.
	p. c.	p. c.	p. c.	p. c.		
1·0340	86·74	4·17	9·09	13·26	"	Genuine.
1·0320	87·12	4·16	8·72	12·88	"	"
1·0320	88·39	3·38	8·23	11·61	"	Under average in solids.
1·0320	88·26	3·48	8·26	11·74	"	" "
1·0320	87·80	3·70	8·50	12·20	"	Genuine.
1·0330	87·76	3·70	8·54	12·24	"	"
1·0305	86·40	4·30	9·20	13·50	Miss S. E. Wright	Genuine.
1·0295	87·55	3·83	8·62	12·45	"	"
1·0285	85·27	5·79	8·94	14·63	"	"
1·0316	87·40	3·43	9·07	12·50	"	"
1·0305	85·18	5·02	9·70	14·72	"	"
1·0285	86·75	3·98	9·17	13·15	"	"
1·0326	87·19	3·81	9·00	12·81	A. Lemoine	"
1·0326	87·87	3·19	8·94	12·13	"	Under average in butter fats.
1·0326	86·42	4·52	9·06	13·58	A. Lemoine	Genuine.
1·0312	87·41	4·45	8·14	12·59	T. Macfarlane	"
1·0333	87·13	4·01	8·86	12·87	"	"
1·0312	87·05	4·23	8·72	12·95	"	"
1·0330	87·10	4·09	8·81	12·90	"	"
1·0323	85·67	5·17	9·16	14·33	"	"
1·0324	85·99	4·84	9·17	14·01	"	"
1·0284	88·26	3·82	7·92	11·74	"	Under average in non-fatty solids.
1·0314	88·20	3·22	8·58	11·80	"	Under average in butter fat.
1·0324	86·65	4·46	8·89	13·35	"	Genuine.
1·0324	87·37	3·70	8·93	12·63	"	"
1·0254	89·88	3·45	6·67	10·12	"	Watered, therefore adulterated.
1·0334	87·45	3·73	8·82	12·55	"	Genuine.
1·0324	84·89	5·98	9·13	15·11	E. B. Kenrick	Genuine.
1·0337	87·76	3·22	9·02	12·24	"	Fat below average.
1·0312	88·07	3·51	8·42	11·93	"	Below average in total solids.
1·0330	88·84	2·48	8·68	11·16	"	Partly skimmed.
1·0333	85·10	5·62	9·28	14·90	"	Genuine.
1·0335	86·47	4·37	9·16	13·53	"	"
1·0230	90·84	2·95	6·21	9·16	"	Watered.
1·0337	89·90	1·42	8·68	10·10	"	Skimmed.
1·0323	87·59	3·68	8·73	12·41	"	Genuine.
1·0331	86·88	4·12	9·00	13·12	"	"
1·0360	90·90	0·50	8·60	9·10	"	Skimmed.
1·0331	87·25	3·82	8·93	12·75	"	Genuine.
1·0296	87·54	4·32	8·14	12·46	"	"
1·0319	86·64	4·58	8·78	13·36	"	"
1·0333	87·30	3·73	8·97	12·70	"	"
1·0325	85·67	5·27	9·06	14·33	"	"
1·0299	88·54	3·38	8·08	11·46	"	Below average in total solids.
1·0290	88·28	3·81	7·91	11·72	"	Watered and below average in non-fatty solids.

TABULATED STATEMENT of the

Date of Collection.	No. of Sample.	Name and Address of Vendor.	Quantity.	Cost.	Name and Address of Furnisher.
1905.		*Calgary District.*			
Dec. 14..	21766	W. Maxwell, Ponoka, Alta.	1 pint	0 05	
" 16..	21767	M. Theroux, Wetaskiwin, Alta.	"	0 05	
" 17..	21768	C. A. Pomeroy, Edmonton, Alta.	"	0 05	
" 17..	21769	C. York "	"	0 05	
" 18.	21771	E. Wilson, Strathcona, Alta	"	0 05	
" 21..	21772	V. N. DeMille, Calgary.	"	0 05	
" 22..	21773	E. Hooper "	"	0 05	
" 23..	21775	F. M. Freeze "	"	0 05	
" 23..	21776	D. W. Woolvains "	"	0 05	
		British Columbia District.			
Nov. 26..	23596	James Black, Vancouver	"	0 05	C. Smith, Sea Island, near Vancouver.
" 26..	23597	Main Bros., "	"	0 05	
" 26..	23598	J. N. Bond "	"	0 05	Vendor.
" 26..	23600	Intl. Ice & Cold Storage Co., Vancouver.	"	0 05	
" 26..	23599	Adam Svenceisky, Vancouver	"	0 05	Vendor.
" 26..	24901	Spa Candy Co. "	"	0 05	McKay, Almond & Co
" 27..	24902	P. Young, New Westminster	"	0 05	Vendor
" 27..	24903	F. W. Smith "	"	0 05	"
" 27..	24904	G. E. Murphy "	"	0 05	"
" 30..	24905	W. Clarke, Victoria	"	0 05	"
" 30..	24906	C. Macdonald "	"	0 05	"
" 30..	24907	T. Alexander "	"	0 05	"
" 30..	24908	W. Sinclair "	"	0 05	"
" 30..	24909	Hill & Green "	"	0 05	"
" 30..	24910	L. McRae "	"	0 05	"
Dec. 2..	24914	Charles House, Nanaimo	"	0 05	"
" 2..	24915	S. Waddington "	"	0 05	"
" 2..	24916	Charles House "	"	0 05	"

SESSIONAL PAPER No. 14

Inspection of Whole Milk—*Concluded.*

Specific Gravity at 15c.	Water.	Butter Fat.	Other Solids.	Total Solids.	Analyst.	Remarks by the Analyst.
		Result of Analysis.				
	p. c.	p. c.	p. c.	p. c.		
1·0337	87·71	3·17	9·12	12·29	Miss S. E. Wright	Under average in butter fat.
1·0306	88·03	3·31	8·66	11·97	"	"
1·0317	87·08	4·03	8·89	12·92	"	Genuine.
1·0286	88·45	3·92	7·63	11·55	"	Under average in non-fatty solids.
1·0306	86·71	4·72	8·57	13·29	"	Genuine.
1·0327	87·22	3·82	8·96	12·78	"	"
1·0286	88·32	3·58	8·10	11·68	"	Under average in total solids.
1·0317	88·64	2·97	8·39	11·36	"	Partly skimmed.
1·0266	84·42	8·07	7·51	15·58	"	Under average in non-fatty solids.
1·0300	87·08	4·00	8·92	12·92	Dr. C. J. Fagan	Genuine.
1·0260	89·93	2·17	7·90	10·07	"	Watered.
1·0290	87·90	3·29	8·81	12·10	"	Genuine.
1·0290	88·25	3·42	8·33	11·75	"	"
1·0300	86·14	4·66	9·20	13·86	"	"
1·0280	88·46	3·16	8·38	11·54	"	Under average in total solids.
1·0302	86·98	4·32	8·70	13·02	"	Genuine.
1·0260	88·54	3·75	7·71	11·46	"	Under average in non-fatty solids.
1·0290	87·75	3·90	8·35	12·25	"	Genuine.
1·0290	88·27	3·44	8·19	11·63	"	"
1·0340	87·65	3·54	9·41	12·95	"	"
1·0289	89·74	2·88	7·38	10·26	"	Watered.
1·0280	88·75	3·43	7·82	11·25	"	Under average in total solids.
1·0330	86·64	4·20	9·16	13·36	"	Genuine.
1·0310	86·56	4·57	8·83	13·44	"	"
1·0340	86·08	4·42	9·50	13·92	"	"
1·0320	87·26	3·80	8·94	12·74	"	"
1·0340	86·61	4·70	9·69	14·39	"	"

APPENDIX H.

BULLETIN No. 94—CIDER.

OTTAWA, February 6, 1904.

W. J. GERALD, Esq.,
Deputy Minister of Inland Revenue.

SIR,—In accordance with your instructions of August 4, 1903, a collection was made in November and December last of 41 samples of commercial cider, the whole of which were examined in this laboratory by Mr. J. G. A. Valin, the results of whose work are given in the accompanying tabulated statement.

The specific gravity of these samples, taken at 15·5 C, varies from 1·0025 with 9·54 per cent of alcohol by volume to 1·0688 with only 1·13 per cent. Seventeen out of the forty-one samples contain less than 1 per cent of alcohol by volume, and may be regarded as non-alcoholic. The specific gravities of these vary from 1·0368 to 1·0627, the latter figure being probably higher than the density of pure apple juice. In 1896, I had occasion to determine the gravity of five samples of what was said to be fresh apple juice, made at Lambeth near London, Ont., for the production of cider vinegar. They ranged from 1·0464 to 1·0485 at 18° C. Two samples of apple juice 'fresh from the press,' intended for the manufacture of cider, were supplied to this laboratory in October, 1903, and after filtration found to have specific gravities respectively of 1·0546 and 1·0573 at 15.5° C. Having in view these variations it would seem necessary to obtain, at the place of production, undoubtedly genuine samples of fresh and pure apple juice before drawing any conclusions regarding the samples described in the tables as to their containing added water or sugar.

It will be observed that fourteen of these ciders have been found to contain small quantities of salicylic acid, the addition of which to alcoholic fermented or other portable liquors renders them, according to the Adulteration Act, liable to be considered as adulterated in a manner injurious to the health.

I have the honour to be, sir,
Your obedient servant,

THOMAS MACFARLANE,
Chief Analyst.

SAMPLES OF CIDER

RESULTS of Examining 41

Date of Collection.	Nature of Sample.	Number of Sample.	Name and Address of Vendor.	Cost. Quantity.	Cost. Cts.	Name and Address of Manufacturer or Furnisher.
Nov. 26	New Cider.	20409	H. W. Shenton, Springhill, N.S.	3 pints.	0 15	Allen, Norwich, Ont.
" 26	"	20410	McLeod Bros., Amherst, N.S.	"	0 10	Unknown, purchased through R. Eaton, Kentville.
" 27	"	20415	S. M. Bentley, Truro, N.S.	"	0 12	D. Burgess, Sheffield Mills
" 30	"	20416	J. E. Walker, Dartmouth, N.S.	"	0 15	Unknown, purchased through Mumford Bros., Halifax.
" 30	"	20419	Rooney & Lovett, Halifax, N.S.	"	0 15	F. Lunn, Falmouth, N.S.
Dec. 4	"	4385	Jas. Ching, Summerside, P.E.I.	"	0 25	Dearborn & Co., St. John, N.B.
" 5	"	4388	Jas. Duffey, Charlottetown.	"	0 20	S. Allen, Norwich, Ont.
" 5	"	4389	F. While, Charlottetown	"	0 25	" "
Nov. 25	"	17988	J. H. Walker, 149 King St. East, St. John.	"	0 15	" "
" 25	"	17989	Harry G. McHeath, 239 Charlotte St., St. John, N.B.	"	0 15	E. Purdy, Deep Brook, Annapolis, N.S.
Dec. 11	"	17999	Beaton & Co., City Market, Moncton.	"	0 15	A. L. Goodwin, St. John, N.B.
" 12	"	18000	J. D. Leblanc, Main St., Moncton.	"	0 20	" "
Nov. 30	Apple Cider	24525	A. Papineau, St. Césaire, Que.	2 bottles	0 25	Vendor
Dec. 4	"	24527	Pagnuelo Frères, St. Hyacinthe.	"	0 20	F. X. St. Charles, Montreal.
" 7	"	24528	E. Ducharme, Mt. St. Hilaire	"	free	Himself
" 10	"	24529	Joseph Vachon, Valleyfield	"	0 25	J. P. Delisle, Valleyfield
Nov. 27	"	21478	J. Bambrick, 50 George St., Ottawa.	3 pints	0 20	Allen, Norwich
" 27	"	21479	Wall & Co., Market Square, Ottawa	1 quart	0 15	About 3 weeks in stock
Dec. 12	"	24531	J. P. Delisle, Valleyfield	2 bottles	0 20	T. Kinsella, Montreal
" 16	"	23488	O. Gratton, 2094 St. Catherine St., Montreal.	1 quart	0 10	Not known
" 16	"	23489	L. P. Forrest, 1978 St. Catherine St., Montreal.	"	0 10	
" 16	"	23490	Gravel Frères, St. Catherine St.	"	0 15	S. Allen, Norwich, Ont.
" 16	"	23491	P. Elliott, City Councillor St., Montreal.	"	0 12	
" 3	"	23281	Kelly Bros., Queen St. E., Toronto.	"	0 10	Stratford Bros., Brantford
" 3	"	23282	W. Nettleton, 125 Church St., Toronto.	"	0 10	S. Allen, Norwich, Ont.
" 3	"	23283	Medland Bros., King St. E., Toronto.	"	0 15	Not given
" 4	"	23284	Andrew G. Bain, King St. E., Hamilton.	"	0 12	"
" 4	"	23285	Hazel & Son, King St. W., Hamilton.	"	0 14	"
" 1	Sweet Cider	22174	Robt. Gardiner, 760 William St., London.	"	0 10	M. Routledge, London
" 3	"	22182	Sol. Allen, Norwich	"	0 10	S. Allen, Norwich
" 4	"	22183	J. Ford & Co., Brantford	"	0 05	Stratford Bros., Brantford
Nov. 23	"	23919	E. T. Drewry, Winnipeg	3 quarts	0 40	
" 23	"	23920	The Blackwoods Co., Ltd., Winnipeg.	3 pints	0 25	S. Allen, Norwich, Ont.
" 24	"	23921	McNab & Roberts, Winnipeg	3 quarts	0 25	" "
" 24	"	23922	Hudson Bay Co., Winnipeg.	"	0 45	
Dec. 17	"	21770	Hallier Aldridge, Edmonton, Alta.	3 pints	0 20	S. Allen, Norwich, Ont.
" 17	"	21774	S. Laurendeau, Calgary, Alta	"	0 25	" "
" 1	"	24912	W. J. Savory, Victoria	"	0 40	Self
" 1	"	24913	M. Faletto, Nanaimo	"	0 40	Rimmings, Nanaimo
" 1	"	24917	H. A. Edgelt, Vancouver.	1 pint	0 25	W. Bowman, Sumas, B.C.
			Kavanagh Bros., Ottawa			S. Allen, Norwich, Ont.

Samples of Cider.

RESULTS OF ANALYSIS.

Sp. Gr. of Sample.	Sp. Gr. of Distillate.	Alcohol by Volume.	Sp. Gr. of Residue.	Total Solids by Balling's Table.	Sugars by Fehling. Reducing Sugar stated as invert.	Reducing Sugar after inversion.	Cane Sugar.	Acidity stated as Malic Acid.	Presence of Salicylic Acid.
		p. c.			p. c.	p. c.	p. c.	p. c.	
1·0265	0·9930	5·00	1·0332	8·244	6·39	6·39	None.	0·72	None.
1·0324	0·9969	2·20	1·0350	8·681	4·72	4·72	None.	0·87	"
1·0228	0·9948	3·69	1·0272	6·780	3·18	4·08	0·86	0·87	"
1·0106	0·9926	5·32	1·0203	5·075	0·99	2·33	1·27	0·87	"
1·0042	0·9910	5·86	1·0108	2·700	0·68	0·88	0·19	0·58	"
1·0301	0·9979	1·42	1·0322	8·000	4·35	6·70	2·23	0·56	Present.
1·0407	0·9955	3·21	1·0446	11·000	8·65	9·72	1·02	0·53	None.
1·0366	0·9947	3·76	1·0410	10·142	8·16	8·16	....	0·63	"
1·0548	0·9996	0·26	1·0552	13·523	8·00	10·33	2·13	0·58	Present.
1·0451	0·9992	0·53	1·0453	11·166				0·57	None.
1·0546	0·9997	0·20	1·0546	13·381	7·68	9·79	2·00	0·60	Present.
1·0564	0·9998	0·13	1·0566	13·857	7·87	12·78	4·60	0·60	"
1·0351	0·9953	3·25	1·0398	8·706	6·22	7·46	1·18	0·62	None fermented.
1·0110	0·9893	7·92	1·0225	5·625	2·35	2·72	0·35	0·88	None
1·0040	0·9916	6·10	1·0124	3·100	0·92	0·99	0·07	0·70	"
1·0029	0·9883	8·80	1·0139	3·475	1·55	1·55	.....	0·46	"
1·0027	0·9924	5·47	1·0097	2·425	0·57	0·59	....	0·58	"
1·0524	0·9989	0·73	1·0544	13·333	5·37	6·09	0·68	0·57	
1·0038	0·9875	9·45	1·0155	3·625	0·78	0·85	0·06	0·58	None.
1.0563	0·9964	0·40	1·0569	13·928	8·80	8·80	.....	0·53	Present.
1·0408	0·9973	1·88	1·0426	10·523	8·05	8·14	0·08	0·99	None.
1·0115	0·9922	5·63	1·0195	4·875	1·68	1·88	0·18	0·58	Traces fermented.
1·0570	0·9992	0·53	1·0582	14·238	9·09	11·32	2·19	0·56	Present.
1·0688	0·9983	1·13	1·0705	17·113	10·94	14·94	3·80	0·72	"
1·0588	0·9997	0·20	1·0588	14·381	9·46	13·35	2·75	0·58	"
1·0627	0·9997	0·20	1·0637	15·534	6·22	7·93	1·62	0·58	"
1·0558	1·000	....	1·0558	13·666	6·14	11·54	5·13	0·58	"
1·0276	0·9954	3·28	1·0319	7·925	5·96	6·54	0·55	1·28	None.
1·0530	0·9997	0·20	1·0530	13·000	9·16	10·29	1·45	0·75	Present.
1·0531	0·9999	0·07	1·0531	13·023	6·02	9·02	2·84	0·46	None
1·0398	0·9949	3·62	1·0443	10·928	7·71	7·71	......	0·87	
1·0025	0·9874	9·54	1·0155	3·875	1·77	1·77	None.	0·57	"
1·0552	0·9995	0·33	1·0553	13·547	3·43	6·20	2·63	0·57	Present.
1·0570	1·000	None.	1·0572	14·000	8·53	11·82	3·12	0·58	"
1·0562	0·9997	0·20	1·0565	13·833	8·31	11·73	3·24	0·58	"
1·0333	0·9951	3·49	1·0383	9·488	7·27	7·78	0·48	0·58	None.
1·0555	0·9996	0·26	1·0560	13·714	9·04	10·50	1·39	0·70	Present.
1·0352	0·9922	5·63	1·0427	10·547	5·62	8·39	2·63	0·74	None.
1·0368	0·9989	0·73	1·0384	9·512	4·86	8·79	3·72	0·37	"
1·0045	0·9913	6·32	1·0131	3·275	0·63	0·63	......	0·97	"
1·0476	0·9981	1·26	1·0495	12·166	7·05	10·11	2·90	0·76	"

APPENDIX I.

BULLETIN No. 95—GROUND SPICES.

W. J. GERALD, Esq., OTTAWA, February 19, 1904.
Deputy Minister of Inland Revenue.

SIR,—I beg to submit herewith a series of tabulated statements showing the results obtained in this laboratory in examining a number of samples of ground spices, collected in accordance with your instructions of August 11 last. They were collected in the months of August and September, 1903, and were obtained of different sorts, in various districts and in the numbers given in the following statement :—

	Black Pepper.	White Pepper.	Red Pepper.	All Spice.	Mixed Spices.	Cassia and Cinnamon.	Cloves.	Ginger.
Nova Scotia	6	4	0	3	3	0	2	2
P. E. Island	6	0	0	2	1	0	1	0
New Brunswick	6	1	0	3	0	3	2	4
Province of Quebec	10	8	0	2	0	2	1	0
Montreal district	8	11	0	0	0	0	2	0
Kingston district	4	10	0	0	0	3	1	0
Toronto district	8	9	0	0	0	0	0	1
London district	8	3	0	2	0	2	2	2
Manitoba district	5	5	3	1	0	1	2	0
Calgary district	4	2	0	0	1	0	0	1
British Columbia	11	1	0	3	0	0	0	0
	76	54	3	16	5	11	13	10

Based on the opinions of the analysts which are stated in the tables, the following recapitulation shows the extent to which adulteration prevailed among the 188 samples just enumerated :—

	Genuine.	Doubtful.	Adulterated.	Total.
Black pepper	33	1	42	76
White pepper	23	1	30	54
Red pepper	0	1	2	3
All spice	13	2	1	16
Mixed spices	3	0	2	5
Cassia or Cinnamon	1	0	10	11
Cloves	9	2	2	13
Ginger	6	0	4	10
	88	7	93	188

From the foregoing it appears that only 46·8 per cent of these samples of ground spices were genuine, the remainder being doubtful or adulterated.

A memorandum by Mr. McGill, explaining the method adopted by him in examining the ground gingers is attached to this report.

I have the honour to be, sir,

Your obedient servant,

THOMAS MACFARLANE,

Chief Analyst.

INSPECTION OF BLACK PEPPER—

Date of Collection	Number of Sample.	Name and Address of Vendor.	Quantity.	Cost.	Name and Address of Manufacturer or Furnisher.	Results	
						Water Soluble.	Soluble in Acid after Water.
				$ cts.		p. c.	p. c.
Sept. 14..	20356	W. C. Anderson, Halifax, N.S.	3 pkgs..	0 30	J. P. Mott, Dartmouth, N.S.	2·78	1·92
" 14..	20357	R. Urquhart & Son, Halifax, N.S.	3 " ..	0 25	Schwartz & Sons, Dartmouth	1·68	3·12
" 15..	20361	J. L. Archibald & Son, Halifax, N.S.	3 " ..	0 25	Brown & Webb, Halifax..	2·36	2·58
" 18..	20371	H. C. Barnaby & Sons, Bridgewater.	3 " ..	0 21	J. P. Mott & Co., Halifax..	2·06	2·24
" 18..	20373	Freeman Bros., Bridgewater.	3 " ..	0 21	R. B. Seaton, Halifax	1·96	2·70
" 23..	20389	E. W. Crease, Halifax.....	3 " ..	0 21	Brown & Webb, Halifax....	2·40	2·52
" 19..	4348	W. A. Poole, Montague, P.E.I.	¾ lb...	0 24	J. P. Mott & Co., Halifax..	2·10	1·44
" 19..	4349	J. A. McDonald, Cardigan, P.E.I.	¾ " ..	0 21	Simpson & Co., Halifax.. .	2·00	1·38
" 19..	4351	H. F. Feehan, Mount Stewart, P.E.I.	¾ " ..	0 21	Dearborn & Co., St. John, N.B.	1·68	3·00
" 19..	4363	W. C. Strong, Sunnyside, P.E.I.	½ " ..	0 14	Severts, Halifax	1·92	2·80
" 27..	4368	A. L. McDonald, Souris, P.E.I.	¾ " ..	0 25	Could not tell where purchased.	2·28	2·82
" 27..	4369	Stevens Bros., Souris, P.E.I.	½ " ..	0 16	Simpson Bros.. Halifax.....	2·88	2·26
" 19..	17926	Baird & Peters, Ward St., St. John, N.B.	¾ " ..	0 24	Berry imported by vendors. Ground and packed in Halifax.	2·02	1·60
" 26..	*17945	John O'Neill, Moncton, N.B.	¾ " ..	0 30	F. H. Harris & Co., Moncton. N.B.	2·30	2·22
" 28..	*17950	Geo. Stables, Newcastle, N.B.	¾ " ..	0 25	....	1·18	3·64
" 28..	17946	W. G. Bell, Moncton, N.B..	¾ " ..	0 30	S. H. & A. S. Ewing, Montreal.	1·58	1·70
" 8.	17958	Murchie Bros., Charlotte, N.B.	¾ " ..	0 25	A. J. Leed, St. Stephen, N.B	2·12	1·90
" 12..	17973	H. C. Jewett, Fredericton. N.B.	3 pkgs..	0 30	Todhunter, Mitchell & Co., Toronto.	2·30	2·06
Aug. 28..	23607	Ringuet et fils, Rimouski... .	1 lb...	0 20	Dearborn & Co., St. John. N.B.	2·28	1·78
" 28..	23608	Joseph Parent, Rimouski....	1 " ..	0 22	Dr. E. Morin. Quebec.....	1·78	2·78
" 29..	23609	M. Bernier, Rivière du Loup.	1 " ..	0 25	N. Rioux, Quebec.	2·54	2·78
" 31..	23614	J. A. Jarvis, Rivière du Loup.	¼ " ..	0 15	Hudon, Hebert et Cie, Montreal.	2·20	2·20
Sept. 1.	23619	A. G. Lambert, Lévis.....	1 " ..	0 24	Herron, Montreal...	0·80	3·18
" 3..	23630	Blais & Huard, Thetford....	1 " ..	0 30	Laporte, Martin & Co., Montreal.	0·96	4·78
" 3..	23633	N. P. Tanguay, Weedon . ..	1 " ..	0 25	....	1·40	4·48
" 5..	23638	Woodman & McKee, Coaticook.	1 " ..	0 30	L. Chaput et fils, Montreal.	1·80	3·26
" 16..	23643	G. H. Hill, Lachute.....	1 " ..	0 30	Forbes Bros., Montreal.....	0·90	8·30

* Samples 17945 and 17950. In the original bulletin the name of Messrs. S. H. and A. S. Ewing of

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Tabulated Statement of Results.

OF ANALYSIS.

Ash.		Loss at 95° C. Moisture, &c.	Petrolic Ether Extract.	Microscopical Examination, &c.	Analyst.	Observations.
Acid Insoluble Sand.	Total.					
p. c.	p. c.	p. c.	p. c.			
0·72	5·42	10·34	5·74	Pepper tissues only, with some chips and dirt.	Miss E. Davidson	Unadulterated.
		10·72	6·56			
2·09	6·80	10·60	7·00	A little charcoal, many hairs and a foreign tissue unidentified.	"	Doubtful.
		10·48	6·08			
1·06	6·00	10·60	6·80	Pepper tissues only; coarsely ground....	"	Unadulterated.
		10·72	7·36			
0·58	4·88	10·52	7·52	Pepper tissues only.	"	Genuine.
		10·48	7·60			
1·88	6·54	9·36	4·56	Much maize and wheat starch and many stone cells.	"	Adulterated.
		9·44	4·88			
1·54	6·46	10·12	7·00	Pepper tissues only; coarse and dirty....	"	Unadulterated.
		10·24	6·84			
0·26	3·80	8·70	7·15	Apparently pure; contains some fibrous tissues.	"	
		8·60	7·10			
0·18	3·56	8·85	7·55	A little charcoal or roasted shell, otherwise pure.	"	
		8·70	7·55			
2·54	7·22	8·20	5·05	Much wheat starch, fibrous tissue, mustard husks and white stone cells.	"	Adulterated.
		8·35	5·00			
1·38	6·10	8·10	5·85	Pepper tissues only	"	Genuine.
		8·30				
1·18	6·28	8·35	7·35	"	"	"
		8·40	7·55			
0·84	5·98	7·60	7·50	"	"	"
		7·70	7·70			
0·28	3·90	8·70	8·10	"	"	"
		8·65	8·10			
0·74	5·26	7·95	9·00	Some buckwheat and wheat starch. ..	"	Slightly adulterated.
		7·75	8·70			
8·69	13·42	7·15	0·75	Contains maize and other foreign starch, many stone cells, some charcoal and fibrous tissues, also a substance resembling turmeric.	"	Adulterated, being composed of dirt and not much pepper.
		7·15	0·85			
0·44	3·72	7·55	7·20	Pepper tissues only	"	Genuine.
		7·95	7·40			
0·20	4·22	7·30	7·15	Some wheat and rice starch present... ..	"	Adulterated.
		7·25	7·35			
0·22	4·58	6·40	8·70	Pepper tissues only.....	"	Genuine.
		6·50	8·75			
0·18	4·24	11·40	2·55	Wheat (and large amount) flour present; musty and caked.	"	Adulterated.
		11·55	2·65			
5·24	9·80	8·15	5·45	Wheat and rice (or buckwheat) flour present.	"	"
		7·90	5·30			
1·10	6·42	9·50	9·45	Pepper tissues with a few hairs....	"	Genuine.
		9·50	9·40			
1·42	5·82	8·10	10·75	Pepper tissues only..	"	"
		8·05	10·85			
3·84	7·85	9·40	5·40	Contains much wheat starch, turmeric, much fibrous tissue, charcoal, hairs, &c.	"	Adulterated.
		9·10	5·80			
5·68	11·42	9·15	3·65	Contains but little pepper but much fibrous tissue, hairs, dirt, &c., also rice starch, mustard husk and turmeric.	"	"
		9·20	3·50			
7·16	13·04	10·10	3·20	Fibrous tissue, hairs and dirt present, also some roasted shells or charcoal.	"	"
		10·00	3·45			
3·70	8·76	10·50	8·50	Genuine, but contains an excess of sand..	A. Lemoine.....	
		10·40	8·35			
6·34	15·54	9·05	5·75	Pepper tissue and sweepings.....	"	
		8·95	5·90			

Montreal was in error, given as that of the manufacturer or furnisher.

INSPECTION OF BLACK PEPPER—

Date of Collection	Number of Sample.	Name and Address of Vendor.	Quantity.	Cost.	Name and Address of Manufacturer or Furnisher.	Results	
						Water Soluble.	Sol. in Acid after water.
				S cts.		p. c.	p. c.
Sept. 17..	23648	C. E. Laflamme, St. Jerome.	1 lb ...	0 20	J. Duffy, Montreal.	1·10	4·06
Aug. 24..	21383	Black & White, 2084 Notre Dame St., Montreal.	1 " ..	0 25	Ground for the vendor by R. Herron & Co.	3·60	3·10
" 25..	21385	J. Normandeau, 2266 Notre Dame St.	.....	...	Not given.....	1·68	3·06
" 25..	21387	A. Brisbois, 2358 Notre Dame St.	....		D. C. Brosseau & Co.....	1·24	3·08
" 25..	21391	G. Dubord, 139 Island St., Montreal.	1 b...	0 20	R. Herron & Co., Montreal.	1·28	2·02
Sept. 11..	21393	G. L. E. Guimond, Beauharnois, Que.	1 " ..	0 25	Hudon, Hubert & Co., Montreal.	1·10	5 00
" 11..	21395	Omer Marchand, Beauharnois	1 " ..	0 20	L. Chaput, Fils & Co.....	0·66	1·42
" 16..	21398	A. Allard, Lachine..... ...	1 " ..	0 25	Laporte, Martin & Co., Montreal.	1·20	4·88
" 16..	21499	H. T. Barre, 2 St. Catherine St., Maisonneuve.	1 " ..	0 40	Not known.....	0·50	2·08
Aug. 26 .	21403	J. M. Moag, Smith's Falls, Ont.	1 " ..	0 25	Pure Gold Co	2·12	1·68
" 27..	21413	C. Whitney, Prescott, Ont...	1 " ..	0 25	Hamilton Coffee and Spice Co.	2·40	1·88
" 27..	21407	Cameron & Soper, Brockville, Ont.	1 " ..	0 25	C. H. Cochrane & Co., Ottawa.	2·22	2·30
" 27..	21411	Jas. McDougall, Brockville..	1 " ..	0 25	Not given	0·94	1·34
Sept. 2..	23222	W. J Hobson, 29 King E., Hamilton.	1 " ..	0 40	....	2 06	2·78
" 2..	23224	M. Cummings, 302 James St.	1 " ..	0 25	....	3·22	2·50
" 3..	23228	T. J. Medlands, 228 Queen W., Toronto.	1 " ..	0 25	. ...	1·12	1·94
" 3..	23230	Frank Lyons, 622 Queen W., Toronto.	1 " ..	0 30	Toronto Coffee and Spice Co.	1·06	2·06
" 4..	23232	John Irvine, 552 Queen W...	1 " .	0 30	Todhunter & Mitchell .	1·48	1·86
" 5..	23237	Hartman & Co., Brantford ..	1 " ..	0 20	Not given	1·72	1·82
" 5..	23239	T. B. Paisley, 182 Queen E., Toronto, Ont.	1 " ..	0 25	Humphrey, Toronto, Ont..	0·86	1·76
Aug. 22..	23256	C. R. Storey, 252 Queen E., Toronto.	1 " ..	0 20	Not given	2·92	3·16
" 24 .	22118	B. B. Gunn, Seaforth, Ont ..	1 " ..	0 30	Todhunter & Mitchell, Toronto.	2·80	1·42
" 25..	22125	John & Jas. H. Kerr, Wingham.	1 " ..	0 30	Gorham & Eckhart, London, Ont.	1·36	2·72
" 26..	22131	John W. McIntyre, Walkerton, Ont.	1 " ..	0 30	Todhunter & Mitchell, Toronto.	2 20	2·08
" 26..	22135	T. H. Ellis & Co., Mount Forest.	1 " ..	0 25	Canada Spice and Grocers Co., London, Ont.	2·56	1·84
" 31..	22138	Setlers Bros., Palmerston. Ont.	1 " ..	0 30	Canada Spice and Grocers Co., London, Ont.	3·38	2·28
Sept. 1..	22140	Beck & Schell, Berlin.....	½ " ..	0 13	Dunn & Co., Hamilton	2·32	1·92
" 1..	22145	Geo. Hasenflug, Waterloo....	½ " ..	0 13	Grocers Wholesale Co., Hamilton.	1·64	1·76

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Tabulated Statement of Results.

OF ANALYSIS.

Ash.		Loss at 70° C. Moisture, &c.	Petrolic Ether Extract.	Microscopical Observations.	Analyst.	Observations.
Acid Insoluble Sand.	Total.					
p. c.	p. c.	p. c.	p. c.			
6·50	11·66	10·25	0·85	Contains wheat starch, excess of stone cells and sweepings.	Alph. Lemoine	Adulterated.
		10·60	0·90			
2·70	9·40	7·00	3·90	Foreign starch, maize, excess of long stone cells and dust.	"	"
		7·60	3·80			
3·16	7·90	7·30	3·60	Wheat flour; black unbleachable substance, probably charcoal, and excess of long stone cells.	"	"
		6·90	3·50			
3·86	8·18	6·15	3·90	Pepper tissue and sweepings	"	"
		6·10	3·86			
8·26	11·56	6·45	3·55	Wheat starch, roasted shells or charcoal and pepper sweepings.	"	"
		6·65	3·35			
7·92	14·62	6·70	3·40	Long stone cells in excess and pepper sweepings.	"	"
		6·80	3·60			
2·44	4·52	7·55	0·60	Rice and maize starch and charcoal. Very little pepper tissue.	"	"
		7·40	0·50			
10·12	16·20	6·35	3·70	Contains excess of pepper sweepings	"	"
		6·35	3·75			
2·90	5·48	7·70	0·40	Not much pepper; long stone cells in excess.	A. Lemoine	Grossly adulterated.
		7·70	0·50			
0·30	4·10	8·35	7·35		"	Genuine.
		8·25	7·75			
0·22	4·50	8·80	6·80		"	"
		8·70	6·65			
0·84	5·36	9·15	6·35		"	"
		9·05	6·75			
0·94	3·22	8·95	2·20	Long stone cells in excess, probably from cocoanut shells.	"	Adulterated.
		9·20	2·20			
0·48	5·32	7·80	6·70		"	Genuine.
		7·90	7·10			
0·62	6·34	8·50	6·25		"	"
		8·35	6·00			
0·78	3·84	7·25	2·70	Wheat starch, roasted shells or charcoal	Alph. Lemoine	Adulterated.
		7·00	2·65			
1·04	4·16	5·90	3·60	Wheat and rice starch, Cayenne pepper; many stone cells, probably cocoanut shell.	Miss E. Davidson	"
		5·95	3·55			
0·68	4·02	6·10	3·90	Cocoanut shell	"	"
		6·10	3·90			
0·16	3·70	5·50	4·15	Buckwheat (or rice) starch, a little wheat starch; turmeric; very many stone cells.	"	"
		5·60	4·40			
1·04	3·66	7·92	*5·48	Stone cells and other foreign matter	A. McGill	Adulterated. Alcohol extract.
0·52	6·60	7·85	3·85	Wheat starch	"	Adulterated.
		7·75	4·45			
0·14	4·36	9·50	7·00	Pepper tissues only	Miss E. Davidson	Genuine.
		9·30	7·05			
1·92	6·00	8·95	4·85	Some stems and a little charcoal; otherwise genuine, although dirty.	"	"
		8·90	4·95			
0·34	4·62	5·30	7·90	Pepper tissues only	"	"
		5·50	7·60			
0·50	4·90	8·45	6·75	Some hairs and fibrous tissue, a very little wheat starch.	"	Adulterated.
		8·50	6·85			
0·62	6·28	7·75	6·45	Hairs and spiral vessels; a little wheat starch.	"	"
		7·80	6·60			
0·68	4·92	8·20	4·25	Much wheat flour; long stone cells (cocoanut?)	"	"
		8·10	4·15			
0·40	3·80	8·25	3·60	Some wheat flour, hairs and much fibrous tissue; many stone cells and foreign tissue unidentified.	"	"
		8·25	3·75			

INSPECTION OF BLACK PEPPER—

Date of Collection.	Number of Sample.	Name and Address of Vendor.	Quantity.	Cost.	Name and Address of Manufacturer or Furnisher.	Results: Water Soluble.	Results: Soluble in Acid after Water.
				S cts.		p. c.	p. c.
Aug. 19..	22148	John Sloan, Galt.....	½ " ..	0 15	Todhunter & Mitchell, Toronto.	2·94	1·68
" 20..	17477	A. E. Key, Minnedosa, Man.	½ " ..	0 15	....	1·76	3·20
" 21..	17483	Galloway Bros., Gladstone, Man.	½ " ..	0 15	....	3·52	1·90
" 21..	17489	C. J. McClocklin, Carberry..	½ " ..	0 20	... ...	1·74	2·04
" 21..	17494	B. Meek, Virden, Man ...	½ " ..	0 15	. .. .	2·52	2·22
" 21..	17498	S. J. Staples, Carman, Man..	½ " ..	0 15	....	1·76	2·08
Sept. 8 ..	21744	Philips Bros., Red Deer, Alta.	½ lb...	0 15	Not known.....	1·40	4·60
" 11..	21755	Douglass Bros., Strathcona..	3 tins..	0 30	The Dyson Co., Winnipeg..	1·08	2·96
" 11..	21757	Maclaren & Co., Strathcona.	½ lb...	0 20	" " ..	0·94	3·28
" 15..	21760	Chesney & Hicks, Calgary...	3 tins..	0 45	Great Western Spice Mills, Winnipeg.	0·98	6·02
" 25..	23558	Beane & Co., Vancouver.....	3 cans..	0 30	R. Herron & Co., Montreal.	1·32	3·30
" 25 ..	23560	Clarke & Rogerson, Vancouver.	3 " ..	0 30	Not known	1·12	4·32
" 25..	23563	Labelle & Co., Vancouver...	3 " ..	0 30	Stember & Earle, Victoria..	1·94	1·62
" 2..	23572	James Young, Nanaimo.....3	bots..	0 40	J. A. Folger & Co., San Francisco.	2·06	1·58
" 2..	23575	James Hurst, Nanaimo.. ...	3 cans..	0 40	Oriental Mills, Vancouver..	1·22	1·12
" 2..	23576	A. R. Johnston & Co., Nanaimo.	3 " ..	0 30	H. G. Dunn & Co., Hamilton, Ont.	1·88	2·58
" 2..	23577	" " ..	3 " .	0 30	A. Schilling & Co., San Francisco.	2·44	1·60
" 2..	23578	Geo. Bevilockway, Nanaimo.	3 " ..	0 40	F. F. Dalley & Co., Hamilton, Ont.	1·46	1·78
" 4..	23586	W. E. Morrison, Ladysmith	3 " ..	0 30	Kelly, Douglas & Co., Vancouver.	0·98	0·88
" 4..	23589	A. J. Sinclair.	3 " ..	0 30	W. H. Walker & Co., Vancouver.	1·00	1·08
" 6..	23590	T. S. Annandale, New Westminster.	3 pkgs..	0 30	Hamilton Coffee and Spice Co., Hamilton.	2·94	1·84

SESSIONAL PAPER No. 14

Tabulated Statement of Results—*Continued.*

OF ANALYSIS.

Ash.		Loss at 95° C. Moisture, &c.	Petrolic Ether Extract.	Microscopical Examination, &c.	Analyst.	Observations.
Acid Insoluble Sand.	Total.					
p. c.	p. c.	p. c.	p. c.			
0·28	4·90	8·20	7·50		A. Lemoine	Genuine.
		8·05	7·70			
3·22	8·18	10·50	5·05	Wheat starch and charcoal or roasted cells	"	Adulterated.
		10·60	5·35			
0·34	5·76	10·10	5·35		"	Genuine.
		9·90	5·70			
0·80	4·58	9·75	7·25		"	"
		9·65	7·35			
0·36	5·10	11·10	8·50		"	"
		11·25	8·30			
0·72	4·56	12·65	6·35		"	"
		12·35	6·00			
6·80	12·80	9·27	3·85	Pepper tissue, sweepings and sand	A. Lemoine	Adulterated.
		8·99	4·20			
4·56	8·69	7·65	3·85	Some wheat starch, pepper tissues, sweep-	"	"
		7·40	3·75	ings and sand.		
5·66	9·22	10·05	3·95	Wheat starch, long stone cells and sand.	"	"
		10·00	3·75			
5·08	12·08	6·20	2·70	Wheat flour, charcoal or roasted shells, and	"	" (sold as compound).
		6·20	2·70	excess of sand.		
3·70	8·32	10·15	4·20	Wheat flour, pepper tissue, a little char-	"	Adulterated.
		10·20	4·40	coal or roasted shells.		
5·06	10·50	8·50	1·75	Wheat starch, long stone cells, and roasted	"	"
		8·35	1·70	shells or charcoal.		
0·22	3·78	7·75	5·75	Wheat flour	"	"
		7·40	5·96			
0·34	3·98	10·50	7·10	Pepper tissue only	"	Genuine.
		10·30	7·45			
0·78	3·12	8·35	4·15	"	"	"
		8·40	4·00			
2·76	7·22	8·15	6·30	Wheat flour	"	Adulterated.
		8·00	6·55			
0·20	4·24	7·65	7·05	Pepper tissue only		Genuine.
		8·00	6·80			
0·20	3·44	8·00	3·50	Wheat flour, and charcoal or roasted shells	A. Lemoine	Adulterated.
		7·75	3·50			
0·99	2·76	8·60	4·90	Pepper tissue only	Miss E. Davidson	Genuine.
		8·40	4·60			
·68	2·76	9·85	4·40	"	"	"
		9·65	4·60			
0·18	4·96	6·35	6·15	"	"	"
		6·35	6·25			

INSPECTION OF WHITE PEPPER—

Date of Collection	Number of Sample.	Name and Address of Vendor.	Quantity.	Cost.	Name and Address of Manufacturer or Furnisher.	Alcohol Extraction
				$ cts.		p. c.
Sept. 14 .	20355	W. C. Anderson, Halifax, N.S....	3 pkgs.	0 15	J. P. Mott & Co., Dartmouth	....
" 15..	20358	R. Urquhart & Co., Halifax.....	3 " ..	0 30	Schwartz & Sons, Dartmouth	.....
" 18..	20372	H. C. Barnaby & Sons, Bridgewater, N.S.	3 " ..	0 30	Todhunter & Mitchell, Toronto.	.....
....	*20379	W. B. Calhoun & Co., Middleton, N.S.	3 for..	0 30	T. B. Barker and Sons, St. John, N.B.	...
Aug. 29..	17931	Dearborn & Co., St. John, N.B...	3 pkgs.	0 25	Dearborn & Co., St. John, N.B.	....
" 29..	23610	M. Bernier, Rivière du Loup . .	1 lb ...	0 35	N. Rioux, Quebec.	6·65
" 31..	23613	Damiens et Cie., Rivière du Loup.	1 " ...	0 50	Jos. Viel, Rivière du Loup..	1·92
Sept. 1 .	23622	E. Thivierge, Lévis, Que.....	1 " ...	0 40	E. Couture, Lévis, Que.. ..	3·32
" 2..	23624	S. P. Brosseau, Quebec	¾ " . .	0 22	. ...	1·50
" 3..	23631	A. S. Johnson, Thetford.....	1 " ...	0 30	Whitehead Burrier, Quebec..	3·36
5..	23634	Coaticook Chem. Co., Coaticook...	1 " ...	0 25	J. A. Matheson & Co., Montreal.	6·80
" 5..	23637	Woodman & McKee, Coaticook...	1 " ...	0 40	Pure Gold Mfg. Co., Toronto	6·35
" 15..	23639	Dme. L. Gagnon, Ste. Rose.	1 " ...	0 40	Laporte, Martin & Cie., Montreal.	5·32
" 22..	21382	J. H. Caille, 702 St. Catherine St., Montreal.	1 " ...	0 35	Marrotte & Leblanc.....	
Aug. 24..	21384	Black & White, 2084 Notre Dame St., Montreal.	1 lb...	0 35	Ground for the vendors by R. Herron & Co.	7·22
" 24..	21365	J. Normandeau, 2266 Notre Dame St. Montreal.	1 " ...	0 35	Not given	4·84
" 24..	21386	A. Brisbois, 2358 Notre Dame St..	1 " ...	0 30	D. C. Broneau & Co.	2·97
" 24..	21388	Martin & Rabeau, 168 Centre St...	1 " ...	0 35	Marrotte & Leblanc	4·22
" 24..	21390	G. Dubord, 189 Island St.	1 " ...	0 30	"	4·99
Sept. 11 .	21392	G. L. Guimond, Beauharnois, Que.	1 " ...	0 35	Hudson, Herbert & Co.....	6·10
" 11..	21396	J. G. Leonard " ..	1 " ...	0 35	F. F. Dally & Co	5·44
" 15..	21397	A. Allard, Lachine..... .	1 " ...	0 35	Laporte, Martin & Co., Montreal.	4·39
" 16..	21399	W. Bosisquet, 554 Notre Dame St., Maisonneuve.	1 " ...	0 40	Not known..... .	3·90
" 16..	21498	H. F. Barre, 2 St. Catherine St., Maisonneuve.	1 " . .	0 40	"	.....
" 26..	21402	J. M. Moag, Smith's Falls..... ..	1 " ...	0 40	Pure Gold Co.....	7·77
" 26..	21404	Cook & Halfpenny, Smith's Falls..	....		Not given	7·45
" 27..	21406	Cameron & Soper, Brockville	... ...		"	7·07
" 27..	21408	R. N. Dowsley "	1 lb...	0 40	"	4·85
" 27..	21410	Jas. McDougall "	1 " ...	0 30	"	2·93
" 27..	21412	C. Whitney, Prescott..	1 " ...	0 35	J. W. Chamberlin & Co., Prescott.	3·46
Aug. 28..	21415	R. Nichols, Cornwall, Ont.....	1 " ...	0 40	Not known.....	6·57
" 28..	21416	" "	1 " ...	0 30	"	6·80
Sept. 1..	21433	W. G. Rogers, Gananoque, Ont...	1 " ...	0 35	Pure Gold Co....	5·61
" 1..	21434	J. S. Watt " ..	1 " ...	0 40	S. H. & A. S. Ewing.. ...	4·94
" 2..	23221	W. J. Hobson, 29 King East, Hamilton.	1 " ..	0 40	. . ..	5·84
" 2..	23223	M. Cummings, 302 James, Hamilton.	1 " ...	0 40	F. F. Daly Co....	4·95

NOTE.—Sample white pepper 21390 was sold as pepper, paid for as such and divided, after which given at time of sale that article was other than pepper.

* Sample 20379. In the original bulletin the name of the Maritime Spice and Coffee Co., was, in

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Tabulated Statement of Results.

RESULTS OF ANALYSIS.

Ash.				Loss at 95° C. Moisture, &c.	Petrolic Ether Extract.	Microscopical Examination.	Analyst.	Observations.
Soluble in Water.	Soluble in Acid after Water.	Acid Insoluble Sand.	Total.					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.			
0·36	0·66	0·06	1·08	10·32	5·20	Pepper tissues only..	Miss E. Davidson.	Unadulterated.
				10·68	4·68			
0·60	2·10	0·26	2·96	12·40	4·62	A little charcoal	" ..	"
				12·16	4·52			
0·30	1·56	0·42	2·28	11·04	5·20	Pepper tissues only; some husk.	" ..	"
				10·80	5·00			
0·58	2·02	0·28	2·88	10·52	4·00	Maize starch and a little wheat; many stone cells.	" ..	"
				10·36	4·20			
0·66	2·22	0·24	3·12	9·45	7·30	Pepper tissues only..	"	Genuine.
				9·45	7·10			
0·12	0·94	.....	1·06	13·95	....	Pepper..	A. McGill. .	"
0·26	1·50	..	1·76	10·83	.....	Wheat flour and other foreign matter.	"	Adulterated.
6·46	4·06	...	4·52	12·12	...	Foreign tissues..... ..	"	"
0·62	2·88	.....	3·50	24·28	....	Corn starch & much foreign tissue-fermenting matter.	"	"
0·24	3·90	. .	4·14	11·23	...	Rice starch and other foreign matter.	"	"
1·16	1·90	.... .	3·06	12·24	.....	Pepper..	" ..	Genuine.
0·08	0·74	.....	0·82	13·31	.....	"	" . .	"
0·36	2·20	. ..	2·56	12·88	.. .	Wheat starch, &c....	"	Adulterated.
0·82	1·04	0·24	2·10	10·45	4·30	Rice flour and a little wheat starch.	A. Lemoine...	"
				10·35	4·15			
0·58	1·60	.....	2·38	8·83	.. ..	Pepper tissues..	A. McGill ...	Genuine.
0·50	1·50	.	2·00	8·33	....	Rice starch, &c.....	"	Adulterated.
0·34	3·14	. ....	3·48	8·43	....	"	" ...	"
0·76	1·16	.....	1·92	9·35	. ...	Wheat and rice starches, &c.	"	"
0·72	1·20	.....	1·92	9·63	.....	Maize starch, &c... . .	" .. .	"
0·62	5·16	... .	5·78	8·68	.....	Pepper tissues	"	Genuine.
0·40	2·08	.....	2·48	9·58	.....	Wheat starch, &c.....	"	Adulterated.
1·04	7·92	.. ..	8·96	7·60	. .	Many starch cells.....	"	"
0·70	1·22	...	1·92	9·35	.....	Maize starch, &c.....	"	"
0·44	1·86	1·06	3·36	8·65	2·05	Wheat starch present	A. Lemoine ..	"
				8·45	1·95			
0·20	1·24	.....	1·44	9·14	.....	Pepper tissue.....	A. McGill ...	Genuine.
0·12	0·88	... .	1·00	9·16	.....	"	" ...	"
0·16	0·94	...	1·10	9·05	. .	"	"	"
0·52	1·74	.....	2·26	9·17	. ....	Wheat flour, &c.....	"	Adulterated.
0·32	1·96	.....	2·28	9·62	.. ....	"	"	"
0·34	1·98	.....	2·32	9·31	.....	"	"	"
0·56	2·76	.....	3·32	9·45	.....	Pepper tissues	"	Genuine.
1·10	6·18	.....	7·28	8·39	.....	"	"	"
0·56	4·20	.....	4·76	9·10	.....	"	"	"
0·44	2·38	... ..	2·82	9·88	....	"	"	"
1·16	1·32	.....	2·48	9·98	.....	"	"	"
0·40	2·04	.....	2·44	10·19	..	Wheat starch, &c.....	"	Adulterated.

vendors said it was a compound. The package was not marked 'Compound,' and no indication was error, given as that of the manufacturer or furnisher.

INSPECTION OF WHITE PEPPER—

Date of Collection	Number of Sample.	Name and Address of Vendor.	Quantity.	Cost.	Name and Address of Manufacturer or Furnisher.	Alcohol Extraction.
				$ cts.		p. c.
Sept. 2..	23225	J. L. Brown, 47 McNab St	1 lb. ..	0 35	F. F. Daly Co...	7·36
3..	23227	T. J. Medland, 228 Queen, Toronto	1 „ ...	0 40	Not given	2·57
3..	23229	Frank Lyons, 622 Queen St. West, Toronto.	1 „ ...	0 30	Toronto Coffee and Spice Co.	
„ 3..	23231	John Irvine, 552 Queen St. West, Toronto.	1 „ ...	0 40	Todhunter & Mitchell.....	5·51
„ 4..	23236	Hartmann & Co., Colborne St., Toronto.	1 „ ...	0 40	Not given	...
„ 5..	23238	T. B. Paisley, 182 Queen St. East, Toronto.	1 „ ...	0 25	Humphrey, Toronto..	3·57
„ 5..	23240	C. R. Story, 252 Queen St. East, Toronto.	1 „ ...	0 30	Not given.	
Aug. 20..	22109	W. F. O'Neill, Clinton, Ont	¾ „ ...	0 30	Todhunter & Mitchell, Toronto.	6·85
Aug. 24..	22122	H. M. Tudhope, Wingham	1 „ ...	0 40	Hamilton Coffee and Spice Co., Hamilton.	6·13
„ 25 ..	22126	John Waddell, Harrison, Ont.....	1 „ ...	0 40	Gorman & Eckart, London, Ont.	4·84
„ 19..	17478	Wright & Co., Minnedosa, Man.	½ „ ...	0 25	.. ..	6·60
„ 20..	17481	S. Schooley, Gladstone, Man.....	½ „ ...	0 20	....	8·36
„ 21..	17484	J. O'Rielly, Portage Laprairie	½ „ ...	0 25	....	6·11
„ 25..	17495	W. J. Wilcox & Co., Virden, Man.	½ „ ...	0 20	....	
„ 26..	17500	G. D. Raymond, Carmen, Man ...	¾ „ ...	0 30	The Dyson Co., Winnipeg	
Sept. 10..	21754	Revillion Bros., Edmonton..	3 tins..	0 30	W. G. Dunn & Co., Hamilton.	.. ..
„ 15..	21761	W. Pitman & Co., Calgary, Alta..	½ lb...	0 20	Codville & Co., Winnipeg.	
„ 4..	23587	Simon Léiser & Co., Ladysmith, B.C.	3 cans .	0 40	Simon Léiser & Co., Victoria, B.C.	...

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Tabulated Statement of Results—*Concluded.*

RESULTS OF ANALYSIS.

Ash.				Loss at 95° C. Moisture.	Petrolic Ether Extract.	Microscopic Observations.	Analyst.	Observations.
Soluble in Water.	Soluble in Acid after Water.	Acid insoluble Sand.	Total.					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.			
0·30	1·20	.....	1·50	10·08	.. .	Pepper tissue.....	A. McGill....	Genuine.
0·30	1·78	.....	2·08	9·39	....	Wheat flour, &c., other foreign tissues.	"	Adulterated.
0·28	1·80	0·24	2·32	11·95 11·60	4·45 4·25	Wheat starch present, and long stone cells, probably of cocoanut.	A. Lemoine. .	"
0·20	1·90	.....	2·10	9·80	.....	Wheat flour.....	A. McGills...	"
1·00	1·40	0·20	2·60	8·50 8·70	6·50 6·40	A little wheat starch	A. Lemoine...	Slightly adulterated.
0·62	1·08	.....	1·70	9·53	.....	Wheat flour and other starches.	A. McGill....	Adulterated.
0·22	1·84	0·20	2·26	9·10 9·10	3·90 3·75	Wheat starch.....	A. Lemoine...	"
0·18	1·46	... .	11·91	.....	....	Pepper tissues..	A. McGill...	Genuine.
0·38	2·74	.. .	3·12	13·11	....	Pepper tissues	A. McGill....	Genuine.
0·40	1·84	. .	2·24	12·16	. .	Wheat flour	"	Adulterated.
0·16	0·86	.....	1·02	14·90	. ...	Pepper tissue.....	"	Genuine.
1·04	2·46	....	3·50	12·22	...	Wheat flour and buckwheat	"	Adulterated.
0·32	1·60	.....	1·92	14·90	...	Pepper tissue.....	"	Genuine.
				70° C.				
0·28	1·22	0·14	1·64	10·80 10·50	4·55 4·75	Wheat starch and a little charcoal.	Miss E. Davidson.	Adulterated.
0·52	1·96	1·14	3·62	6·40 6·50	4·15 3·95	Many whitestone cells present (apparently foreign).	" .	"
1·32	2·08	0·66	4·06	8·15 7·85	5·35 5·50	Some wheat starch and tumeric.	" ..	"
0·76	2·00	1·18	3·94	10·30 10·35	6·55 6·55	Pepper tissues only	" ..	Genuine.
1·56	0·90	0·14	2.60	10·00 9·95	6·00 5·95	Contains much potato starch.	" .	Adulterated.

INSPECTION OF RED PEPPER—

Date of Collection	Number of Sample.	Name and Address of Vendor.	Quantity.	Cost.	Name and Address of Manufacturer or Furnisher.
				$ cts.	
Aug. 20..	17479	A. E. Remlin, Neepawa, Man.	½ lb...	0 20	....
" 21..	17485	Hudson Bay Co., Portage Laprairie.	½ " ...	0 20	....
" 26..	17499	W. T. Roblin & Co., Carman, Man.	½ " ...	0 20	....

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Tabulated Statement of Results.

Result of Analysis.							Analyst.	Observations.
Ash.								
Water soluble.	Soluble in Acid after Water.	Total.	Moisture.	Alcohol Extract.	Dry residue insoluble in Alcohol.	Sum. Direct Estimation.		
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		
11·28	1·22	12·50	8·86	21·60	69·54	99·96	A. McGill.	Has a bright red colour; does not dye wool in acid bath; microscope shows wheat starch and some foreign tissues. The high soluble ash and alcoholic extraction are remarkable. Adulterated with starch and other materials.
4·70	3·54	8·24	9·22	7·52	83·62	100·36	"	Reddish salmon colour; does not dye wool in acid bath; microscope shows no starch, but some apparently foreign tissue. Not identified.
2·36	3·02	5·38	8·92	13·92	77·90	100·74	"	Reddish salmon colour; dyes wool in acid bath; microscope shows much wheat starch and foreign tissues. Adulterated with flour and coloured with a coal tar dye.

INSPECTION OF ALLSPICE Tabulated Statement of Results.

Date of Collection	No. of Sample.	Name and Address of Vendor.	Quantity.	Cost.	Name and Address of Manufacturer or Furnisher.	Microscopic Examination.	Observations.	Analyst.
1903.				cts.				
Sept. 14	20352	A. L. Doyle & Co., Halifax, N.S.	3 pkgs.	0 15	W. H. Schwartz & Sons, Halifax, N.S.	Pimento tissues	Genuine	A. McGill.
" 15	20363	J. L. Archibald & Son "	3 "	0 18	Simson Bros., Halifax	"	"	"
" 15	20390	E. W. Crease, "	3 "	0 21	Brown & Webb "	"	"	"
Aug.	1361	Brace & McKay, Sunnyside.	½ lb.	0 12	Hudon, Herbert & Co., Montreal	"	"	"
" 27	1372	Geo. Rackham, Charlottetown	¼ "	0 11	Carroll Bros., Charlottetown.	"	"	"
" 20	17930	Frank E. Williams, 80 Charlotte St., St. John.	¼ "	0 36	Dalton Bros., Toronto, Ont	Essentially pimento; a little maize starch.	Doubtful.	"
" 29	17951	Adams, Burns & Co., Water St., Bathurst.	¼ "	0 30	John P. Mott, Halifax, N.S.	Pimento tissues.	Genuine	"
Sept. 8	17959	Henry E. Hill, King St., Charlotte, N.B.	¼ "	0 30	Unknown	"	"	"
Aug. 31	23616	Romeo Lesperance, Montmagny, Q.	1 "	0 40	Maxwell & Co., Toronto.	Unusually large number of stone cells.	Doubtful.	"
"	23625	M. W. Coleman, Quebec	¼ "	0 38	S. H. & A. S. Ewing, Montreal	Pimento tissues	Genuine	"
" 22	22119	Andrew Young, Seaforth			Todhunter & Mitchell, Toronto	"	"	"
" 26	22136	J. S. Ireland, Mount Forest			" " "	"	"	"
" 20	17480	John Small, Neepawa	3 cans.	0 30		"	"	"
" 25	23562	J. Charters, Vancouver	3 "	0 30	B. C. Coffee & Spice Co., Vancouver.	Wheat and barley starches.	Adulterated	"
"	23573	James Young, Nanaimo	3 bottles	0 40	J. A. Folger & Co., San Francisco.	Pimento tissues	Genuine	"
"	23574	H. A. Millar "	3 "	0 35	Simon Leisser, Victoria, B.C.	"	"	"

INSPECTION OF MIXED SPICES—Tabulated Statement of Results.

Date of Collection	No. of Sample.	Name and Address of Furnisher	Quantity.	Cost.	Name and Address of Manufacturer or Furnisher.	Analyst.	Observations.
1903.				$ cts.			
Sept. 15..	20362	J. L. Archibald & Son, Halifax, N.S.	3 pckgs...	0 15	J. P. Mott & Co., Halifax.....	A. McGill..	Ground spices; wheat flour present; adulterated.
" ..	20380	W. B. Calhoun & Co., Middleton, N.S.	*3 " ...	0 30	T. B. Barker & Sons, St. John, N.B.	" ..	Mixed whole spices; genuine.
"	4373	Geo. Rackham, Charlottetown...	½ lb. ..	0 20	Carroll Bros., Charlottetown ...	" ..	Ground spices; genuine.
" 10..	21753	Garipley & Lessard, Edmonton..	3 tins. .	0 40	The Great West Spice Mills, Winnipeg.	" ..	Mixed spices, maize and some wheat starch; adulterated.
" 18..	20374	Freeman Bros., Bridgewater, N.S.	*3 pkgs...	0 30	J. P. Mott & Co., Dartmouth, N.S.	" ..	Mixed whole starch; genuine.

* Pickling spice.

INSPECTION OF CASSIA AND GROUND

Date of Collection	No. of Sample.	Name and Address of Vendor.	Quantity.	Cost.	Name and Address of Manufacturer or Furnisher.
				$ cts.	
Aug. 20..	17929	C. S. Philips, cor. Douglas Avenue and Main St., St. John, N.B.	¾ lb.	0 25	Todhunter, Mitchell Co., Toronto.
" 31..	23615	A. Blais, Montmagny, Que.	1 "	0 40	Standard Spice Mills, Three Rivers.
Sept. 1..	23620	Chas. Castonguay, Lévis	1 "	0 40	Whitehead & Turner, Quebec..
Aug. 26..	21405	Cook & Halfpenny, Smith's Falls, Ont.	1 "	0 35	Not given
" 27..	21409	R. N. Dowsley, Brockville, Ont.	1 "	0 40	"
Sept. 1..	21432	T. A. Rogers, Gananoque	1 "	0 40	"
Aug. 25	22132	Whitehead Huether, Walkerton	1 "	0 40	Pure Gold Spice Manufacturers, Toronto.
Sept. 1..	23141	Stuebing & Co., Berlin	½ "	0 20	Gorman Eckhart, London, Ont.
Aug. 24..	17491	J. Bower & Co., Brandon	½ "	0 20	
" 29..	17953	A. N. DesBrisay, Bathurst, N.S.	¾ "	0 25	Todhunter, Mitchell & Co., Toronto.
Sept. 9..	17963	Jas. F. McCluskey, Grand Falls, N.B.	3 pkgs.	0 30	Maritime, Spice and Coffee Co., St. John, N.B.

NOTE.—Since Cassia and Cinnamon are the barks of allied species of Cinnamomi, they necessarily valueless portions of cortex and wood; and is characterized by a greater preponderance of bast cells, and these species; and even its indications must be accepted with caution, since some samples of each species

CINNAMON—Tabulated Statement of Result.

Result of Analysis.						
Hydroscopic Moisture.	Ash.			Remarks.	Opinion.	Analyst.
	Total.	Soluble.	Insoluble.			
p. c.	p. c.	p. c.	p. c.			
... ...	6·66	0·37	6·29	Cassia tissue	Adulterated ...	A. McGill
... .	3·22	0·92	2·30	Chiefly cassia	" ...	"
... ...	8·92	0·52	8·40	Cassia.....	"	
... ...	3·22	0·60	2·62	Cassia tissues and foreign starch. ...	"	"
... ...	4·00	1·68	2·32	Cinnamon and cassia tissues.....	" ...	"
.....	4·56	0·64	3·92	Chiefly cassia tissues....	"	"
... .	4·08	0·84	3·24	Cinnamon with some cassia	" ...	"
.....	4·90	0·78	4·12	Chiefly cassia...	" ...	"
.....	8·26	1·46	6·80	Cassia tissues.....	" ...	
8·42	2·76	0·96	1·80	Ground cassia : adulterated with wheat flour.	"	"
7·08	6·58	0·98	5·60	Ground cassia : apparently genuine. ...	" ...	"

have many features in common. The latter is distinguished by having been more carefully freed from other structural peculiarities. Hence the microscope is the chief and only reliable means of differentiating closely approximate to those of the other.

A. McGILL.

INSPECTION OF GROUND CLOVES—

Date of Collection	Number of Sample.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher.
Sept. 15.	20364	J. L. Archibald & Co., Halifax	Brown & Webb, Halifax
" 15.	20378	W. B. Calhoun & Co., Middleton, N.S.	Maritime Spice and Coffee Co., St. John.
Aug. 27.	4367	A. Currie & Co., Souris, P.E.I	N. Rattenburg, Charlottetown
" 25.	17941	King Asbell & Co., Sussex, N.B	G. S DeForest & Sons, St. John
Sept. 8.	17956	E. M. Ganong, Charlotte	A. J. Teed Co., St. Stephen, N.B
" 8.	23626	E. G. Turcot, Quebec	Turcot Frères & Cie, Quebec
Aug. 25.	21389	Martin & Rabeau, 168 Centre St., Montreal	Marrotte & Leblanc
" 25.	21394	Omer Marchand, Beauharnois	L. Chaput fils & Co.
" 27.	21414	J. H. Bradley, Prescott	H. P. Eckardt & Co.
Sept. 4.	23235	James & Deming, Colborn St., Brantford	F. F. Dally Co.
" 1.	22142	Beutzer & Co., Berlin, Ont	Gorman, Eckart & Co., London
Aug. 21.	17490	W. J. Young, Brandon, Man	
" 27.	23701	G. R. Hanna & Co., Carman	

NOTE.—The adulteration in some of the above samples consists in the addition of foreign matter of cloves. Part of this tissue (e.g. woody fibre) may come from admixture of clove stems, but this cannot be volatile matter, and the very marked lowering of the volatile oil. Of course, these features might come October, 1900.—A. McGILL.

Tabulated Statement of Results.

Result of Analysis.

Ash.			Hygroscopic Moisture.	Volatile Oil.	Total Volatile Matter.	Remarks	Analyst.
Total.	Insoluble.	Soluble.					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		
5·94	2·82	3·12	3·30	14·50	17·80	Colour light, coarse, genuine	A. McGill.
7·82	4·48	3·34	5·18	9·74	14·92	Colour normal, fine; insoluble ash high and a decided trace was insoluble in acid; some tissues doubtfully genuine; doubtful.	"
6·78	3·68	3·10	3·28	14·78	18·06	Light colour, coarsely ground, clove tissues only, genuine.	"
7·08	3·84	3·24	4·28	14·48	18·76	Colour light, fine, genuine	"
6·14	3·20	2·94	4·18	17·76	21·94	Colour normal, fine, genuine	"
6·52	3·28	3·24	7·54	12·22	19·76	Colour dark, coarse, genuine	"
7·00	3·76	3·24	4·26	5·52	9·78	Colour dark, fine, taste weak, excess of stone cells, foreign tissue, adulterated.	"
6·76	3·48	3·28	5·22	10·46	15·68	Colour light, coarse, genuine	"
5·64	2·80	2·84	6·00	15·54	21·54	Colour normal, fine, genuine	"
6·50	3·34	3·16	4·68	13·14	17·82	" " "	"
5·96	3·10	2·86	6·72	15·86	22·58	" " "	"
6·22	3·20	3·02	9·56	12·70	22·26	Colour normal, coarse, some doubtful structures under microscope, hygroscopic moisture very high, doubtful.	
6·98	3·86	3·12	5·96	5·54	11·50	Colour light, coarse, taste feeble, foreign tissues of light colour, but non-starchy, adulterated.	"

non-starchy character, containing stone cells and other vegetable tissues not largely present in genuine certainly determined. The effect of this adulteration is shown in the considerable lowering of the total from addition of exhausted cloves. The methods of analysis adopted are those laid down in Bulletin 78,

INSPECTION OF GINGER—

Date of Collection	Number of Sample.	Name and Address of Vendor.	Quantity.	Cost.	Name and Address of Manufacturer or Furnisher.
				$ c.	
Sept. 15..	20359	W. J. Hopgood, Halifax, N.S.....	3 pkgs..	0 27	Schwartz & Sons, Halifax.....
" 15..	20360	J. L. Archibald & Sons, Halifax, N.S.	3 " ..	0 30	Brown & Webb, Halifax.....
Aug. 20..	17928	E. E. McMichael, 40 Dock St., St. John, N.B.	¾ " ..	0 20	Imported by Vendor and ground here.
" 28..	17949	W. Bannon, Newcastle, N.B.....	¾ lb...	0 30	T. B. Barker & Sons, St. John, N.B.
Sept. 8..	17957	Inches & Grimmer, Charlotte Co.....	3 " .	0 30	Todhunter Mitchell, Toronto....
" 9..	17964	A. J. Martin, Grand Falls.....	3 " ..	0 30	A. J. Teed Co., St. Stephen, N.B.
Aug. 2..	23226	J. L. Brown, 47 McNab St., Hamilton.	1 " ..	0 35	F. F. Dally Co.....
" 2..	23234	James & Deming, Brantford, Ont....	1 " ..	0 40	" .....
" 24..	22121	Geo. Powell, Blyth, Ont.....	1 " ..	0 30	Unknown.....
Sept. 9..	21748	Fowler & Co., Wetaskiwin.....			Blue Ribbon Mfg. Co., Winnipeg.

SESSIONAL PAPER No. 14

Tabulated Statement of Results.

RESULT OF ANALYSIS.

Hygroscopic Moisture.	Cold water extractive, p.c. on dry substances.	Insoluble matter, p. c. on dry substances.	Microscopic Character.	Observations.	Name of Analyst.
p. c.	p. c.	p. c.			
11·62	19·5	80·5	Ginger starch and tissue	Genuine	A. McGill.
11·24	19·7	81·3	"	"	"
10·88	17·5	82·5	"	"	"
11·60	14·3	85·7	"	Contained exhausted ginger or is of lower than average quality.	"
8·12	13·8	86·2			
10·74	19·6	80·4	"	Genuine	"
7·20	21·4	78·6			
12·30	15·1	84·9	"	Contains exhausted ginger or is of lower than average quality.	"
7·78	15·5	84·5			
10·86	14·9	85·1	"	"	"
10·14	18·7	81·3	Ginger starch and tissue with a trace of wheat starch.	Genuine	"
12·40	16·7	83·3	Ginger starch and about 20 p.c. wheat.	Adulterated with foreign starchy matter.	"
12·84	18·9	81·1	Ginger starch, &c., with a trace of foreign starch.	Genuine	"

OTTAWA, December 1, 1903.

Method of working on ground ginger.

The adulteration of ginger usually consists either in the addition of foreign matter (flour, starches, etc.,) or in the use of exhausted rhizomes, *i.e.* ginger from which the valuable principles have been more or less washed out.

The detection of foreign matter is made by means of the microscope; but the residue left after water extraction (as below) is better suited to the uses of the microscopist than in the raw sample.

The detection of exhausted ginger naturally depends upon a knowledge of the extracted matter yielded by the sample and a comparison of this with the normal extractive which genuine ginger yields on similar treatment.

Since the commercial extraction of ginger is made with cold water, this is the proper solvent to use in the laboratory.

Bulletin 48, (May, 1897), p. 13—records the result of four cold water extractions of genuine ginger by Mr. Babington. These gave a maximum of 16·7 and a minimum of 12·3 per cent.; with a mean of 14·7 per cent.—calculated on the dry material. In the extraction of ginger by cold water, much will naturally depend upon the method of carrying out the operation. Unfortunately Mr. Babington has not recorded the method employed by him. I am convinced that the numbers obtained would have been considerably higher, and possibly more constant for genuine ginger, had mechanical agitation been used in treating with the solvent. The advantages of mechanical agitation are sufficiently apparent: the increased effectiveness, and the fact that given conditions can be exactly duplicated, are the most important. I have worked as follows:—

Moisture.—Five grammes of the sample is exposed on a watch glass to a temperature of 90–100 in the water-oven, until constant weight is obtained. When an ordinary drying oven is used this may require 10 to 12 hours or more. With my oven, using a forced draught, 2 to 3 hours is sufficient.

Cold Water Extractive.—The dry sample is transferred by means of a dry funnel, to the centrifuge tube—of about 150 cc. capacity—and treated with 100 cc. of water. The tubes are stoppered and placed in the mechanical shaker (having horizontal motion) for 30 minutes. They are then whirled for 10 minutes, when the insoluble matter becomes compacted tightly in the bottom of the tube and the clear supernatant liquid filters readily. The filtration is made by a weighed filter paper, whose dry weight is known. The undissolved residue is treated a second time with 100 cc. of cold water in the shaker, again whirled, and the clear liquid poured through the filter. Finally, the residue is washed on to the filter using about 100 cc. water. (The exact amount is immaterial, since only negligible traces of soluble matter remain in this residue.)

Where a centrifuge is not available the filtration is very tedious, and sometimes impossible. It may be necessary, in this case, to use two or more filters, or to work on smaller amounts of the sample. In either case the liability to error is much increased.

The filters, with their contents, may be allowed to stand at the ordinary temperature over night; or they may be at once transferred to a drying oven, kept below 50° C—having a forced draught. In this case there is no danger of gelatinizing the starch, and the drying may be completed in a few hours. When approximately dry, the temperature of the oven may be raised to 90°—95° and the drying completed at this tem-

NOTE.—In order to ascertain how much extractive was taken out by the second treatment with 100 cc. water, I determined the loss of weight after one and two treatments, in sample 17957—and obtained for 1 treatment—19·6 per cent. For 2 treatments—21·4 per cent. It is evident from these figures that a third treatment would be superfluous.

perature. The filters with their contents are then weighed (between watch glasses) the more or less lumpy mass carefully transferred to a small mortar, ground up, returned to the filter, and again dried for an hour or two. The second weighing should not materially differ from the first, and gives the dry, insoluble matter.

In order to show how constant is the extractive matter so obtained, I quote the following work done on four samples. The second estimation was made after an interval of three weeks during which the samples had stood on the heating coils of the laboratory. It will be seen that, by this treatment, they had lost about one-third of their natural hygroscopic moisture.

No.	Moisture.	Extractive.	Calculated on Dry Substance	Mean.
20360—(*a*)	11·24	17·48	19·7	20·0
—(*b*)	7·14	18·76	20·2	
17957—(*a*)	10·74	17·46	19·6	20·5
—(*b*)	7·20	19·80	21·4	
17949—(*a*)	11·60	12·66	14·3	14·0
—(*b*)	8·12	12·68	13·8	
17964—(*a*)	12·30	13·24	15·1	15·2
—(*b*)	7·78	14·32	15·5	

It should be noted that 17957 (*a*) is the result of extraction with only 100 cc. of water; the other extractions represent two treatments with water.

When a sample of ginger is treated with water, as described, the re-dried sample always has a distinctly darker colour than the original. Duplicates which have been similarly treated, yield residues, leaving exactly the same colour. Whether or not it would be safe to infer that a dark coloured sample of ginger had undergone washing and drying, would require larger experience than I have had. But I think it safe to regard dark coloured samples with suspicion: and to insist upon their yielding a normal percentage of extractive matter to cold water.

In the accompanying table it will be noted that the first six samples have a good colour, and with the exception of No. 5, which contains about 20 per cent of wheat flour —yield an extractive of at least 19 per cent of their dry weight. The mean extractive for samples 1 to 6 (omitting No. 5) is 19·7 per cent, the extremes being 18·7 and 21·4 per cent.

Since the remaining samples yield a decidedly lower extractive, under similar treatment, there can be little doubt that they represent ginger rhizomes which have been more or less exhausted with water before grinding: or an admixture of ginger which has been fully exhausted and re-dried. This would account for the decidedly darker colour of these samples.

If these samples represent a natural and unadulterated ginger, of a lower grade than that represented by the other samples, we should have evidence of the fact in our possession. I have not met an authenticated sample of ginger which gave less than about 19 per cent of extractive to cold water, when treated as above described.

A. McGILL.

APPENDIX J.

BULLETIN No. 96—JAMS AND JELLIES.

(Revised and Augmented.)

OTTAWA, May 6, 1904.

W. J. GERALD, Esq.,
Deputy Minister of Inland Revenue.

SIR,—In accordance with your instructions of 14th January last, a collection was made of Jams and Jellies, in the course of that and the following month, in the various collection districts of the Dominion. The accompanying tabulated statement (I) gives full particulars regarding the origin and character of each sample in the order as collected by the various food inspectors, and as the districts succeed each other from east to west. Table I also contains the final result of examining each sample briefly stated by Mr. A. McGill, who, assisted by Mr. Alphonse Lemoine, carried out the analyses. The details of the latter are given in a series of additional tables in which the various samples have been classified according to their nature as follows :

A. Raspberry jam.
B. Strawberry jam.
C. Plum jam.
D. Peach jam.
E. Miscellaneous jams.
F. Jellies.

The analytical results given in these tables regarding the samples may be connected with the descriptions given in Table I by means of each serial number.

The total number of samples collected was 78 but five consisted of "jelly powders" which certain food inspectors purchased by mistake. The number should therefore be 73 but, as a matter of fact, 74 analyses were made owing to sample 2,440, the duplicate of which did not correspond in character with the main sample. The following statement is a classification of the whole 74 samples, based upon the analytical results, it being considered that the presence of foreign fruit, or large percentages of glucose constitutes adulteration :—

	Genuine.	Doubtful.	Adulterated.	Total.
A. Raspberry jam	2	1	16	19
B. Strawberry jam	1	1	17	19
C. Plum jam	3	1	8	12
D. Peach jam	0	2	5	7
E. Miscellaneous	0	0	2	2
F. Jellies	8	0	7	15
	14	5	55	74

The number of adulterated samples in this collection is therefore equal to 74·3 per cent. This figure must be regarded as below the truth, since none of the samples were condemned on account of the use only of preservatives or artificial dyes. The position

of this branch regarding the adulteration of jams and jellies may here be stated. They are, as Webster defines jam, the products of boiling fruits with sugar and water. The only word in this definition about which any doubt can exist is the word "sugar". This is defined by the same authority as 'a sweet crystalline substance, obtained from certain vegetable products, as the sugar cane, maple, beet, sorghum, and the like.' This identifies sugar as the substance known to chemists under the names cane sugar, or sucrose. Commercial glucose is not grape sugar, but a product of the action of acids on starch, of very indefinite composition, always containing, as well as reducing sugars, dextrine, water, &c. Every grocer and consumer understands quite well what is meant by sugar, and the substitution of commercial glucose for it in ordinary trade would not be tolerated. It is also to be remembered that reputable manufacturers of jams and jellies use only cane sugar in preserving.

Similar views to the foregoing prevail in other countries and more especially among the Boards of Health in the United States.

In general the rulings of the latter are to the effect that fruit jellies, preserves, canned fruits &c., must consist of the fruit specified on the label of the package, preserved only with cane sugar, and must not contain artificial flavours, colouring matters or preservatives. If such articles contain any substitute for the fruit, or any material to make bulk or weight they are considered to be adulterated.

I have the honor to be, sir,

Your obedient servant.

THOMAS MACFARLANE.

Chief Analyst.

INSPECTION OF JAMS AND JELLIES TABULATED STATEMENT (I.)

Date of Collection.	Nature of Sample.	No. of Sample.	Name and Address of Vendor.	Cost. Quantity.	Cost. Price.	Name and Address of Manufacturer or Furnisher.	Opinion of Analyst.	Serial No.
1904.			*District of Halifax, &c.*		$ cts.			
Jan. 27	Cranberry jam	20420	John Riley, Windsor, N.S.	3 pks.	0 45	Charlottetown Preserving Co., P. E.I.	Adulterated, containing glucose and a coal-tar dye	58
" 27	Greengage plum jam	20423	Grahame & Co., Windsor, N.S.	3 "	0 60	Crosse & Blackwell, London, Eng	Genuine	39
27	Plum jam	20427	Shand Bros., Windsor	3 "	0 25	Canada Biscuit Co., Toronto	Contains a little glucose, and a coal-tar dye. Otherwise genuine	40
" 27	"	20428	W. Smith, Kentville, N.S.	3 "	0 45	Upton's	Contains some glucose, and a preservative. Adulterated	41
" 27	Red currant jelly	20429	" "	3 "	0 60	A. Cairns, Eng	Contains salicylic acid. Otherwise genuine	60
" 27	Apple jelly	20430	DeWolfe & Lamont, Kentville, N.S.	3 "	0 45	Miss Taylor, Kentville, N.S.	Genuine	61
" 27	Plum jelly	20431	" "	3 "	0 40	A. Gooderville & Sons, Welland, Ont.	Adulterated with glucose, and contains salicylic acid	62
" 27	Peach jam	20439	Burgess Quinn, Halifax	3 "	0 30	Canada Preserving Co., Hamilton, Ont.	Adulterated, containing glucose	51
			District of Prince Edward Island.					
" 26	Jam	21401	A. Gates & Co., Charlottetown	3 crocks	0 36	Upton's, Montreal	Adulterated with glucose and dyed	31
" 27	Jelly	21405	J. Ching, Summerside	3 "	0 45	Central Preserving Co., Boston, Mass.	Adulterated with glucose	71
" 27	Jam	21407	J. N. Locke, Summerside	3 tins	0 54	J. W. Windsor, Montreal	Adulterated with glucose, is dyed and contains salicylic acid	11
" 28	Jelly	21408	Sanderson & Co.	3 crocks	0 84	Crosse & Blackwell, London, Eng.	Genuine	72
			District of New Brunswick.					
" 22	Strawberry jam	23805	Baird & Peters, St. John, N.B.	3 jars	0 30	Simcoe Canning Co., Simcoe, Ont	Adulterated with glucose and contains a coal-tar dye	28
" 22	Red currant jelly	23806	W. A. Porter, Cor. Waterloo and Union Sts., St. John	3 "	0 90	Chas. Southwell & Co., London, Eng	Genuine	66

"	26	Plum jam	23811	Chas. C. Philips, Cor. Douglas Ave. and Main St., St. John	3	jars	0 54	H. Goodwillie & Sons, Welland, Ont.	Adulterated with glucose and contains salicylic acid	49
"	28	Crab apple jelly	23812	R. O. McLean & Co., 293 Main St., Moncton, N.B.	3	tumb's	0 45	Vendors	Genuine	67
Feb.	4	Peach jam	23817	Hugh McKenna, King St., St. Stephen	3	jars	0 45	R. Goodwillie & Sons, Welland, Ont.	Adulterated with glucose and contains salicylic acid	55
"	5	Cranberry jelly	23820	Enoch G. Hoben, York St., Fredericton	3	tumb's	0 45	David C. Parent, Queensbury, York	Genuine	68
				District of Quebec.						
Jan.	25	Raspberry jam	23649	George Beausoleil, Terrebonne, Que.	4	lbs	0 40	J. W. Windsor, Montreal	Adulterated with glucose and foreign fruit; contains salicylic acid and a coal tar dye	6
"	26	Strawberry jam	23655	Ed. Carlloux, Joliette, Que.	3	jars	0 45	S. P. Champaux, Joliette	Adulterated with glucose and contains salicylic acid	24
"	26	Raspberry jam	23656	Oscard Roy, Joliette	1	can	0 15	W. B. Newsome & Co., Montreal	" "	7
"	27	Plum jam	23658	A. L. Caisse, Berthierville	1	lb	0 40	Canada Preserving Co., Hamilton	Adulterated with glucose and is dyed	45
"	27	Raspberry jam	23660	Coulombe & Lefebvre, Berthierville	1	can	0 15	Jos. Lamoureux, Montreal	Adulterated with glucose or foreign tissues; is dyed	8
"	28	Strawberry jam	23664	Bellefeuille & Giroux, Trois Rivières	1	pail	0 50	Royal Packing Co., Montreal	Contains glucose and contains salicylic acid, but is sold as compound	25
"	28	Plum jam	23665	S. H. Frigon & Cie, Trois Rivières	1	"	0 50	J. A. Perrault, Montreal	Adulterated with glucose and contains salicylic acid	46
"	28	"	23667	L. Brunelle & frères, Trois Rivières	3	cans	0 45	Jos. Lamoureux, Montreal	Adulterated with glucose and contains a preservative and a dye	47
"	29	Strawberry jam	23666	L. Gingras, 304 Richelieu St., Quebec	3	jars	0 30	L. Letourneau, Quebec	Adulterated with glucose and contains a coal tar dye	26
"	29	Raspberry jam	23673	Chas. J. Boily, 404 St. Valier, Quebec	2	cans	0 30	Montreal Canning and Preserving Co.	Adulterated with glucose and foreign fruit tissues	9
"	29	Strawberry jelly	23678	Thos. Smyth, Quebec	3	pks	0 30	Weir Specialty Co., agents, Toronto.	Labelled 'Oliver's Concentrated Jelly Crystals'	
Feb.	4	Plum jam	23680	J. V. Montplaisir, Drummondville	1	jar	0 45	Himself	Genuine	48
"	4	Strawberry jam	23687	Alex. Dufresne, St. Joseph de St. Hyacinthe	2	cans	0 28	J. A. Perrault, Montreal	Adulterated with glucose and foreign tissues; is dyed	27
				District of Montreal.						
Jan.	20	Upton's strawberry jam	23286	A. Fournier, 1789 St. Catherine St.	3	jars	0 30	Uptons	Adulterated with glucose and contains a coal tar dye	22
"	20	Graham's raspberry jam	23287	C. E. Acethier, 1758 St. Catherine St.	3	"	0 30	Canada Preserving Co.	Adulterated with glucose and foreign fruit tissue; is dyed	3
"	20	Strawberry jam	23288	L. G. Thouin, 487 Lagauchetière St.	3	"	0 15	W. B. Newsome Co, 84 Youville Square, Montreal	Adulterated with glucose and contains salicylic acid	23
"	21	Plum jam	23289	M. F. Lafortune, 116 St. Maurice St.	3	"	0 30	Lamoureaux & Co.	Adulterated with glucose and is dyed	42

INSPECTION OF JAMS AND JELLIES—TABULATED STATEMENT (I.)—*Continued.*

Date of Collection.	Nature of Sample.	No. of Sample.	Name and Address of Vendor.	Cost. Quantity.	Cost. Price.	Name and Address of Manufacturer or Furnisher.	Opinion of Analyst.	Serial No.
1904.			*District of Montreal*—Con.		$ cts.			
Jan. 21	Raspberry jelly	23290	Pilons & Meilleur, 114 St. Maurice St.	3 jars	0 15	Not known	Adulterated with glucose and is dyed	64
" 21	Mrs. Luke's home made crab apple jelly	23291	A. Lamy, 2021 Notre Dame St	3 "	0 30	Mrs. Luke, Montreal	Genuine	65
" 21	Plum jam	23292	" "	3 "	0 30	Uptons	Adulterated with glucose and is dyed	43
" 21	Crown brand plum jam*	23293	M. Kilkerry, 701 Craig St	3 "	0 39	The Royal Packing Co., Montreal	Contains glucose, contains salicylic acid, and is dyed*	44
" 21	Lily brand raspberry jam	23294	Joseph Deneau, 53 Jurors St	3 "	0 30		Adulterated with glucose and foreign fruit	4
" 22	Peach jam	23295	A. Massicotte & Co., 1472 St. Catherine St	2 "	0 50	Paquet et Paquet, Montreal	Adulterated with glucose	53
" 22	Raspberry jam	23296	T. Bergeron, 1522 St. Catherine St	3 "	0 45	" "	" "	5
" 22	Peach jam, King's brand	23297	G. St. Pierre, 1350 Notre Dame St	3 "	0 45		" "	54
			Kingston District.					
" 28	Strawberry jam	25015	Peter Glavey, 37 York St., Ottawa	2½ lbs	0 38	Upton's; taken from a 10-lb. pail	Adulterated with glucose and foreign fruit. Dyed	34
" 28	Raspberry jam	25016	P. L. Foisy, 297 Dalhousie St., Ottawa	3 "	0 30	D. C. Brosseau & Co.; taken from a 10-lb. pail	Adulterated with glucose and dyed; contains very little fruit	15
" 29	Peach jam	25017	Wm. Rhodes, King St., Brockville	3 jars	0 30	Upton's	A little glucose. Doubtful	56
Feb. 1	Red currant jam	25018	F. H. Johns, Princess St., Kingston	3 "	0 30	Simcoe Canning Co	Adulterated with glucose, and dyed.	59
" 1	Strawberry jam	25019	James Crawford, Princess St., Kingston	3 "	0 30	Hamilton Preserving Co	Adulterated with glucose and foreign fruit. Contains salicylic acid and a coal tar dye	35
" 1	Raspberry jam	25020	" "	3 "	0 30	"	Adulterated with glucose and foreign tissues. Is dyed	16
" 1	Red currant jelly	25021	W. R. McRae & Bros., Brock St., Kingston	3 "	0 30	Godwillie & Sons, Welland	Adulterated with glucose, and contains salicylic acid	74

				Toronto District.						
Feb.	2	Raspberry jam	25042	Jno. Irvine, 552 Queen W., Toronto	3	jars	0	30	L. S. Rosemary Co., Hamilton	Adulterated with glucose and foreign tissues. Contains salicylic acid 17
"	2	Strawberry jam	25043	J. Bonel, 559 Queen W., Toronto	3	"	0	30	Montreal Canning Co.	Adulterated with glucose 36
"	2	Raspberry jam	25044	A. Ganathu & Co., 400 Queen W., Toronto	3	"	0	25	Beasley Bros	Adulterated with glucose and foreign fruit tissues. Is dyed 18
"	2	Strawberry jam	25045	" "	3	"	0	25	"	Contains some glucose. Doubtful. 37
"	3	Raspberry jam	25046	C. Lee, 101 King E., Hamilton	3	"	0	30	McCormick Mfg. Co.	Adulterated with glucose and foreign fruit 19
"	3	Peach jam	25047	" "	2½	lbs.	0	25	Taken from 10-lb. jar	Contains a little glucose. Doubtful. 57
"	3	Plum jam	25048	J. H. Horning, 92 John St., Hamilton	3	jars	0	30	Can. Preserving Co.	A little glucose and dyed. Doubtful 50
"	3	Strawberry jam	25049	" "	3	lbs.	0	30	Standard Canning Co.	Adulterated to a slight extent with glucose and dyed 38
				London District.						
Jan.	23	Jelly	22185	B. B. Gunn, Seaforth	3	pks.	0	30	Hamilton Coffee & Spice Co., Hamilton	Labelled "McLaren's invincible powdered vanilla jelly."
"	27	Strawberry jam	22188	Ed. O'Flaherty, Stratford	3	"	0	30	Belford & Co., Hamilton	Adulterated with glucose, and dyed 21
"	28	Peach jam	22194	Scroggie Bros., Guelph	3	pots.	0	30	McCormack & Co., London	Adulterated with glucose 52
"	28	Red currant jelly	22195	J. A. McCrae, Guelph	3	"	0	30	T. A. Littell & Co., Toronto	Genuine 63
"	29	Pure Gold Jelly 'Orange'	22197	T. S. Armstrong, Fergus, Ont	3	pks.	0	25	Pure Gold Mfg. Co., Toronto	Labelled "Pure Gold Jelly prepared in a finely powdered form."
"	29	Calfs foot jelly	22198	"	3	"	0	25	Gorman Eckart & Co., London, Ont	Labelled "Oriental Jelly Powder."
Feb.	6	Raspberry jam	22203	John Bettie, Seaforth	3	jars	0	30	Delhi Canning Co.	Genuine jam, contains salicylic acid. 2
"	8	Grape jelly	22206	Sturdy & Co., Goderich	3	"	0	30	Crown Mfg. Co., Toronto	Labelled "Crown Jelly in powdered form."
				Winnipeg District.						
"	9	Jelly	23925	J. Bower & Co., Brandon	1½	"	0	30	White Star Mfg. Co., Winnipeg	Adulterated with glucose; is preserved with salicylic acid, and is dyed 69
"	10	Jam	23929	W. J. Wilcox & Co., Virden	1½	"	0	25	Upton's, Hamilton	No description or claim with this sample. 29
"	12	Strawberry jam	23932	Hardy & Buchanan, Winnipeg	3	"	0	75	"	Contains some glucose and a preservative. Doubtful. 30
"	12	Jelly	23934	Williamsons Bros., Winnipeg	3	"	0	30	White Star Mfg. Co., Winnipeg	Contains much glucose; is dyed and contains salicylic acid. Adulterated. 70
				Calgary District.						
"	10	Raspberry jam	21778	Groat & Elliott, Strathcona, Alta	3	bots.	0	75	Ely Blands, Toronto, Ont	Genuine jam; but contains a preservative, and is dyed 1
"	11	Strawberry jam	21782	H. N. Dodd, Edmonton, Alta	3	"	0	75	Canada Preserving Co., Hamilton	Adulterated with glucose and dyed. 20

* The word "compound" is printed on bottom of label, barely noticeable.

INSPECTION OF JAMS AND JELLIES—TABULATED STATEMENT (I.)—*Concluded.*

Date of Collection.	Nature of Sample.	No. of Sample.	Name and Address of Vendor.	Cost.		Name and Address of Manufacturer or Furnisher.	Opinion of Analyst.	Serial No.
				Quantity.	Price.			
1904.			*British Columbia District.*		cts.			
Feb. 2	Strawberry jam...	24922	Geo. Wagg, Vancouver.....	15 lbs..	1 50	J. W. Windsor, Montreal..	Adulterated with glucose and foreign fruit; contains salicylic acid, and is dyed	32
" 4	Raspberry jam....	24923	McCulloch Bros., Vancouver	15 " ..	1 40	Simcoe Canning Co., Ontario	Adulterated with glucose and foreign fruit tissues; is dyed.....	12
" 4	Red currant jelly..	24925	City Grocery Co., Vancouver.....	15 " .	1 05	Windsor, Montreal.....	Adulterated with much glucose and is dyed.	73
" 5	Raspberry jam ...	24926	J. P. Nightingale & Co., Vancouver...	15 " ..	1 50	Pure Gold Mfg. Co., Toronto....	A genuine jam, but contains foreign fruit tissue	13
" 5	" ..	24927	London Grocery Co., Vancouver. .	15 " ..	1 50	B.C. Fruit Canning & Coffee Co.	Adulterated with glucose and contains salicylic acid	14
" 5	Strawberry jam...	24928	F. Wright, Vancouver.	15 " .	1 50	Odell & Morris, Victoria, B.C....	Genuine, but contains salicylic acid.	33

TABULAR RESULTS

OF

ANALYSIS OF JAMS AND JELLIES

A.—RASPBERRY

Serial Number.	Departmental Number.	Solids, Per Cent.			Water.	Alcohol Precipitate.		Polarization, 15 per cent Solution.			
		Insoluble.	Soluble.	Total.		Per Cent.	Character.	Direct.	Invert.	Difference.	Invert (1) Reading calculated to Normal.
1	21778	4·24	50·52	54·76	45·24	2·80	Clear and free	+ 3·0	— 7·7	10·7	— 26·4
2	22203	5·85	63·00	68·85	31·15	1·04	" ..	— 1·0	— 9·9	8·9	— 27·2
3	23287	2·34	62·90	65·24	34·76	21·16	Milky, sticky	+31·0	+16·5	14·5	+ 45·3
4	23294	1·74	55·50	57·24	42·76	30·73	" ..	+35·0	+22·0	13·0	+ 70·0
5	23296	1·78	69·12	70·90	29·10	30·91	" ..	+69·0	+64·9	4·1	+163·0
6	23649	1·58	67·66	69·24	30·76	24·70	" ..	+57·0	+46·3	10·7	+117·0
7	23656	1·06	73·50	74·56	25·44	2·85	" ..	+43·0	+29·7	13·3	+ 70·0
8	23660	3·75	71·00	74·75	25·25	19·00	" ..	+53·0	+32·5	20·5	+ 84·0
9	23673	1·92	67·94	69·86	30·14	38·53	" ..	+40·0	+37·4	2·6	+ 94·1
*10	24401	1·56	64·50	66·06	33·94	30·79	" ..	+33·0	+20·9	12·1	+ 56·9
11	24407	1·19	72·16	73·35	26·65	51·64	" ..	+65·0	+55·0	10·0	+132·0
12	24923	1·56	70·54	72·10	27·90	31·09	Milky, sticky	+39·4	+29·7	9·7	+ 74·0
13	24926	1·77	67·66	69·43	30·57	2·15	Clear and free	+ 2·0	—11·7	13·7	— 31·0
14	24927	1·18	67·65	68·83	31·17	38·89	Milky, sticky	+37·0	+23·8	13·2	+ 61·0
15	25016	0·19	73·50	73·69	26·31	64·56	" ..	+81·5	+71·5	10·0	+170·0
16	25020	1·49	62·90	64·39	35·61	20·01	" ..	+49·5	+47·3	2·2	+130·0
17	25042	1·41	54·36	55·77	44·23	10·68	" ..	+34·0	+25·3	8·7	+ 80·0
18	25044	3·00	57·18	60·18	39·82	23·35	" ..	+14·0	+ 9·9	4·1	+ 30·3
19	25046	1·49	59·98	61·47	38·53	16·20	" ..	+25·0	+10·5	14·5	+ 30·3

(1) The numbers in this column are calculated for 26·048 grammes of dry, soluble solids dissolved to
(See page 127.)

* The duplicate of this number is a Strawberry jam.

NOTE.—Jams should be made with cane sugar, unless a formula defining the composition is given.

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JAM, APRIL, 1904.

Sugars.			Preservatives.	Coal Tar Dyes.	Remarks.	Approximate per cent Glucose.	
Cane.	Reducing.	Total.				Dry Glucose in Sugar.	Commercial Glucose in Jam.
14·0	37·0	51·0	Salicylic..	Present...	Genuine fruit. Genuine jam, but contains a preservative, and is artificially dyed.	.....	.....
11·6	46·6	58·2	" ..	None ...	Raspberry fruit only. Genuine jam, with a preservative.	.....	.....
18·8	34·3	53·1	None	Present...	Raspberry and foreign tissue; apparently apple. Adulterated.	30	25
17·0	27·2	44·2	"	None	Raspberry and foreign tissue: apparently apple. Adulterated.	40	30
5·4	34·1	39·5	" ...	"	Genuine fruit. Adulterated with glucose....	75	60
14·0	29·9	43·9	Salicylic..	Present...	Raspberry and foreign tissue; apparently apple. Adulterated.	65	50
17·4	41·5	58·9	" ..	" ..	Genuine fruit. Adulterated.....	40	30
26·6	26·1	52·7	None	" ..	Raspberry tissue and pips of foreign fruit: apparently fig or strawberry. Adulterated.	45	35
3·4	44·4	47·8	"	Doubtful..	Raspberry tissue and foreign tissue (Apple?). Adulterated.	50	35
15·8	36·6	52·4	Salicylic..	Present...	Genuine fruit. Adulterated with glucose, and dyed.	35	25
13·0	33·5	46·5	" ..	" ..	Genuine fruit. Adulterated..	65	50
12·8	37·7	50·5	None	" ..	Raspberry tissue and apparently apple pulp. Adulterated.	40	30
17·8	46·9	64·7	"	None	Raspberry tissue and foreign tissue, apparently apple. A genuine jam, but not entirely of raspberry fruit.	.....	.....
17·0	40·7	57·7	Salicylic..	"	Genuine fruit. Adulterated.....	35	25
13·0	34·0	47·0	None ...	Present...	Raspberry tissues. Adulterated, contains very little fruit.	80	60
2·8	37·5	40·3	"	" ..	Raspberry and foreign tissues, apparently apple pulp. Adulterated.	65	50
11·4	28·2	39·6	Salicylic..	None	Raspberry and foreign tissue, apparently apple. Adulterated.	45	35
5·4	44·0	49·4	None	Present...	Raspberry tissues and foreign tissues (Apple?). Adulterated with glucose, etc.	25	20
18·8	39·8	58·6	"	None ...	Raspberry and foreign tissue, apparently apple. Adulterated with glucose, etc.	25	20

100 cc.; and they form the data by which the glucose percentage in the jam is approximately ascertained

A. McGILL.

B.—STRAWBERRY

Serial Number.	Departmental Number.	Solids, Per Cent.			Water.	Alcohol Precipitate.		Polarization.			
		Insoluble.	Soluble.	Total.		Per Cent.	Character.	Direct.	Invert.	Difference.	Invert (1) Reading to Normal.
20	21782	1·01	63·82	64·83	35·17	35·3	Sticky.....	+41·5	+21·5	20·0	+ 58·1
21	22188	1·71	54·44	56·15	43·85	18·9	"	+24·5	+10·5	14·0	+ 33·7
22	23286	0·69	64·94	65·63	34·37	47·9	"	+32·0	+18·7	13·3	+ 49·8
23	23288	0·66	68·82	69·48	30·52	50·1	"	+30·5	+29·7	9·8	+ 75·2
24	23655	1·01	70·62	71·63	28·37	13·8	"	+39·5	+19·8	12·7	+ 48·8
25	23664	1·93	72·26	74·19	25·81	26·5	"	+60·0	+45·7	14·3	+110·5
26	23668	1·24	60·94	62·18	37·82	38·3	"	+60·0	+58·9	1·1	+167·3
*27	23687	2·96	71·80	74·76	25·24	19·1	"	+52·0	+35·2	16·8	+ 84·1
28	23805	2·21	60·10	62·31	37·69	19·2	"	+38·5	+24·4	14·1	+ 70·9
29	23929	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
30	23932	2·06	61·30	63·36	36·64	4·69	Sticky.....	+33·0	+19·8	13·2	+ 56·7
†31	24401	0·96	58·60	59·56	40·44	11·9	"	+30·5	+18·2	12·3	+ 52·7
32	24922	0·67	73·20	73·87	26·13	42·8	"	+61·0	+47·9	13·1	+114·0
33	24928	2·21	71·08	73·29	26·71	1·4	Free.....	+16·0	−12·7	28·7	— 31·7
34	25015	1·01	69·74	70·75	29·25	9·4	Sticky.....	+26·5	+11·0	15·5	+ 27·2
35	25019	1·69	64·18	65·87	34·13	23·4	"	+49·0	+44·6	4·4	+121·7
36	25043	2·23	70·82	73·05	26·95	22·2	"	+51·0	+41·8	9·2	+102·4
37	25045	1·75	59·84	61·59	38·41	5·9	"	+16·5	+8·8	7·7	+ 26·0
38	25049	2·05	63·30	65·35	34·65	7·8	"	+23·0	+10·4	12·6	+27·5

*This sample is contained in a pasteboard carton, which has been opened, and about two-thirds of the sale.

(1) The numbers in this column are calculated for 26·048 grammes of dry, soluble solids, dissolved to (See page 127).

†The duplicate of this number is a raspberry jam.

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Sugars.			Preservatives.	Coal Tar Dyes.	Remarks.	Approximate per cent Glucose.	
Cane.	Reducing.	Total.				Dry Glucose in Sugar.	Commercial Glucose in Jam.
26·0	25·0	51·0	None.....	Present...	Strawberry tissues only. Adulterated.....	35	28
18·2	32·3	50·5	"	" ...	" " "	25	17
17·2	39·2	56·4	"	" ...	" " "	30	24
13·0	54·3	67·3	Salicylic..	Doubtful .	" " "	45	32
16·6	42·3	58·9	" ..	None.....	" " "	30	26
18·6	33·2	51·8	" ..	Present...	" and foreign tissues "	60	54
1·4	32·8	34·2	None.....	" ...	" tissues only "	80	60
21·8	32·4	54·2	"	" ...	" and foreign tissue. Apparently apple. Adulterated.	45	40
18·4	27·0	45·4	"	" ...	" tissues only. Adulterated..	40	30
.....	.. .	.....	.....	....	No description or claim with this sample.....	.....	.....
17·0	31·7	48·7	Salicylic..	Doubtful .	Strawberry tissues only. Adulterated to a slight extent.	35	27
16·0	38·0	54·0	None.....	Present...	" tissues only. Adulterated.....	35	26
16·8	35.4	52·2	Salicylic..	" ...	" and foreign tissues "	55	50
37·4	36·2	73.6	" ..	" ...	Cane sugar crystallized out. Strawberry tissues only. Genuine.	.....	.....
20·2	41·4	61·6	None.....	" ...	Strawberry and foreign tissues, probably apple. Adulterated.	25	22
5·8	39·2	45·0	Salicylic..	" ...	" " " " ..	65	52
12·0	39·9	51 9	None....	None.....	" tissues only. Adulterated.	55	48
10·0	42·9	52·9	"	Doubtful .	" " " to a slight extent with glucose.	25	19
16·4	37·6	54·0	"	Present...	" tissues only. Adulterated to a slight extent with glucose and dyed.	25	20

contents removed. The remainder is very dry, and is evidently not in a normal condition, as offered for 100 cc.; and they form the data by which the glucose percentage in the jam is approximately ascertained.

A. McGILL.

C.—PLUM JAM,

Serial Number.	Departmental Number.	Solids, per cent.			Water.	Alcohol Precipitate.		Polarization.			
		Insoluble.	Soluble.	Total.		Per Cent.	Character.	Direct.	Invert.	Difference.	Invert ‡ reading to normal.
39	20423	No stones, 0·79	68·36	69·15	30·85	2·6	Free.....	+15·0	— 9·9	24·9	—25·4
40	20427	3 „ 3·72	58·36	62·08	37·92	9·0	Slightly st'ky	+16·2	—10·4	26·6	—30·0
41	20428	4 „ 5·00	59·78	64·78	35·22	3.5	„	+14·5	+12·1	2·4	+34·6
42	23289	No „ 0·62	71·60	72·22	27·78	44·2	Sticky.....	+55·0	+35·2	19·8	+84·1
43	23292	1 „ 1·80	62·50	64·30	35·70	12·2	„	+33·0	+17·0	16·0	+47·0
44	23293	6 „ 11·40	64·18	75·58	24·42	22·3	„	+39·6	+30·3	9·3	+81·0
45	23658	4 „ 6·94	56·30	63·24	36·76	6·5	Slightly st'ky	+23·0	+13·2	9·8	+40·1
46	23665	9 „ 7·80	57·60	65·40	34·60	25·5	Sticky.....	+35·5	+33·0	2·5	+98·4
47	23667	11 „ 15·23	59·32	74·55	25·45	25·4	„ ...	+33·0	+20·5	12·5	+60·1
48	23680	7 „ 7·00	46·06	53·06	46·94	1·5	Free & clean.	— 4·0	— 4·4	0·4	—16·5
49	23811	4 „ 9·45	53·36	62·81	37·19	7·2	Slightly st'ky	+16·0	+14·1	1·9	+46 0
50	25048	4 „ 4·18	59·80	63·98	36·02	5·6	„	+16·2	+ 7·2	9·0	+20·7

D.—PEACH JAM,

51	20439	No stones, 1·19	62·74	63·93	36·07	13·2	Sticky.....	+33·5	+14·3	19·2	+38·4
52	22194	„ 1·24	68·94	70·18	29·82	10·2	„	+27·5	+12·1	15·4	+30·1
53	23295	„ 2·83	68·98	71·81	28·19	52·6	„	+68·0	+58·3	9·7	+145·0
54	23297	2 „ 10·48	64·22	74·70	25·30	22·7	„	+48·0	+28·6	19·4	+78·4
55	23817	No „ 1·23	52·50	53·73	46·27	8·4	„	+16·0	+ 8·8	7·2	+30·0
56	25017	„ 0·88	62·60	63·48	36·52	11·5	„	+22·0	+ 7·7	14·3	+22·0
57	25047	„ 3·37	59·10	62·47	37·53	2·7	Free.....	+18·0	— 7·0	25·0	—20·5

MISCELLANEOUS

*58	20420	3·27	52·12	55·39	44·61	15·4	Sticky.....	+32·5	+31·7	0·8	+106·5
†59	25018	3·19	58·70	61·89	38·11	15·8	„	+44·0	+35·4	8·6	—102·6

* Cranberry jam.
† Red Currant jam.
‡ The numbers in this column are calculated for 26·048 grammes of dry, soluble solid disolved to 100 cc; and they form the data by which the glucose percentage is approximately ascertained. (See page 127.)

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Sugars.			Preservatives.	Coal Tar Dyes.	Remarks.	Approximate per cent Glucose.	
Cane.	Reducing.	Total.				Dry Glucose in Sugar.	Commercial Glucose in Jam.
32·4	36·0	68·4	None.	None.	No stones. Fruit tissues. Genuine.	0	0
34·6	25·5	60·1	"	Present.	3 " A little glucose. Genuine but dyed.	0	0
3·2	36·2	39·4	Salicylic.	None.	4 " per 100 grms. Contains some glucose, and a preservative. Adulterated.	25	19
25·8	29·0	54·8	None.	Present.	No " Contains much glucose and is dyed. Adulterated.	45	40
20·8	32·4	53·2	"	"	1 " per 100 grms. mouldy. Contains glucose, and is dyed. Adulterated.	30	23
12·0	38·7	50·7	Salicylic.	"	6 " per 100 grms., glucose and a preservative. Adulterated.	45	36
12·8	30·1	42·9	None.	"	4 " per 100 grms, some glucose. Adulterated.	25	18
3·2	39·4	42·6	Salicylic.	None.	9 " " " glucose, and a preservative. Adulterated.	50	36
16·2	33·3	49·5	"	Present.	11 " flesh adherent in 5. Glucose and a preservative. Adulterated.	35	26
0·6	43·6	44·2	None.	None.	7 " flesh free, slight mould. Genuine.	5	3
2·4	43·2	45·6	Salicylic.	"	4 " flesh adherent in 2. A little glucose, and a preservative. Adulterated.	30	20
11·8	42·4	54·2	None.	Present.	4 " flesh free. A little glucose and dyed. Doubtful.	15	11

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25·0	30 3	55 3	None	None	No stones. Glucose. Adulterated.	25	20
20·0	41·6	61·6	"	"	" " "	20	17
12·6	32·1	44·7	"	"	" " "	70	60
25·2	23·2	48·4	Benzoic ?.	"	2 " " "	45	36
9·4	37·4	46·8	Salicylic.	"	No " " and a preservative. Adulterated.	25	.....
18·6	36·6	55·2	None	"	Mouldy. A little glucose. Doubtful.	20	16
32·6	20·5	53·1	"	"	" " "	5	3

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1·0	38·2	39·2	None	Present	Glucose. Adulterated	55	36
11·2	30·5	41·7	"	"	" "	55	41

F.—Analytical data on

Serial Number.	Number.	Dry Solids, per cent.	Acidity stated as H_2SO_4.	Sugars—Per cent.			Polarizations. (3)			Alcohol Precipitate.		
				Reducing. (2)	Cane.	Total.	Direct.	Invert.	Temp C.	Per cent.	Character.	Invert (1) Reading to Normal Weight.
60	20429	66·78	·098	41·1	24·6	65·7	+ 7·0	— 9·5	20	1·25	Clear and free...	— 28·4
61	20430	60·90	·125	47·2	9 2	56·4	— 4·0	—10·1	21	3 40	Clear, coherent..	— 33·1
62	20421	67·84	·098	49·5	4·2	53 7	+19·8	+17·0	20	20·65	Milky and sticky	+ 50·0
63	22195	65·76	·031	20 2	47·2	67·4	+22·0	— 9·6	20	0·65	Clear and free...	— 29·1
64	23290	58·32	·010	7·4	42·2	49·6	+32·1	+ 2·9	12	22·90	Milky and sticky	+ 10·0
65	23291	61·12	·045	18·0	41·2	59·2	+20·0	— 7·9	18	0·95	Clear, coherent..	— 26 0
66	23806	69·02	·131	52·6	11·8	64·4	— 1·3	— 9·2	21	4 95	" " ..	— 28·1
67	23812	66·00	·029	56·3	2·0	58·3	— 3·8	— 5·0	12	12·10	Clear and sticky	— 15·1
68	23820	54·76	·054	47·2	4·2	51·4	— 2·2	— 5·0	20	1·50	Clear and free...	— 18·2
69	23925	63·84	·064	31·8	0·6	32 4	+55·0	+54·6	15	47·90	Milky and sticky	+171·0
70	23934	61·80	·053	31·6	6·0	37·6	+63·5	+59·4	15	57 95	" ..	+191·6
71	24405	75·16	·054	37·5	4·0	41·5	+72·0	+69 3	20	48·15	Clear and sticky	+185·0
72	24408	69·60	·069	46·0	20·0	66 0	+ 3·8	—10·0	12	2 30	Clear, coherent..	— 28·6
73	24925	73·98	·040	35·2	10·0	45·2	+56·0	+49 3	20	65·75	Milky and sticky	+133·2
74	25021	73·54	·140	51·7	4·6	56·3	+23·0	+19·8	20	37·25	" ..	+ 53·5

(1) For solutions of 13,024 grammes of the sample in 100 cc.
(2) Calculated as dextrose.
(3) The numbers in this column are calculated for 26,048 grammes of dry solids dissolved to 100 cc., and they form the data by which the glucose percentage is approximately ascertained.—(See page 127).

MEMORANDUM ON JELLIES.

Ottawa, March 8, 1904.

The most complete research into the characters of fruit jellies, to which I have access, is contained in Bulletin 66 of the Bureau of Chemistry, at Washington. The data presented in the accompanying table have been obtained by the methods recommended in the bulletin referred to. In addition to the results tabulated, I may state (1) that no reaction for starch was given by any of the fifteen jelly samples examined; (2) that fruit pulp was found in the following samples: 20429, 20430, 23291, 23806, 23820, 24405, 24408; (3) that the ash of all samples gave very distinct reactions for sulphuric acid, and very faint reaction for hydrochloric acid.

The absence of pulp in jelly is not proof that it is not made from fruit, because the fineness of the texture of the jelly-bag or strainer, and the care with which it has been used, are factors in the case.

The following samples appear to be genuine, in the sense of being made with cane sugar, having no preservative, and no artificial dye:—Nos. 20430, 22195, 23291, 23820, 24408.

To this list may be added Nos. 23806 and 23812, since the small quantity of glucose found cannot be condemned, and it is claimed by manufacturers that the addition of small amounts of glucose is desirable to prevent crystallization of the sugars; a (U. S. Bulletin 66, p. 78) claim, however, which appears to be without justification in fact.

The following samples are adulterated in the sense that glucose has been largely used in their manufacture, instead of the more expensive cane sugar:—Nos. 20431, 23290,

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Jellies, March 8, 1904.

Sugar, free solids.	Ash. Per cent.	Ash. Alkalinity as K_2CO_3.	Preservatives	Artificial Colouring matter.	Remarks.	Number.	Serial Number.	Approximate P. C. Glucose. Dry glucose in Sugars.	Approximate P. C. Glucose. Commd. Glucose in Jelly.
1·08	·440	·317	Salicylic acid	None	Fruit jelly, containing a preservative	20429	60	0	0
4·50	·560	·448	None	"	Genuine fruit jelly	20430	61	0	0
13·14	·350	·297	Salicylic acid	"	Contains glucose, and is preserved with salicylic acid	20431	62	35	29
.....	·170	·109	None	Doubtful	Genuine	22195	63	0	0
8·72	·840	·343	"	Much	Contains glucose and is dyed.	23290	64	10	7
1·92	·300	·203	"	None	Genuine	23291	65	0	0
4·62	·530	·385	"	"	Genuine, with a trace of glucose	23806	66	0	0
7·7	100	·104	"	"	Contains a trace of glucose	23812	67	5	4
3·36	·160	·124	"	"	Genuine	23829	68	0	0
31·44	·770	·228	Present	Salicylic acid	Contains much glucose, is preserved with salicylic acid, and artificially dyed	23925	69	80	62
24·20	·600	·200	"	"	" " "	23934	70	85	66
33·66	·620	·119	None	None	Contains much glucose.	24405	71	85	80
3·60	·360	·231	"	"	Genuine	24408	72	0	0
28·78	·420	·110	"	Much	Contains much glucose and is dyed	24925	73	65	60
17·24	·560	0·336	Salicylic acid	Doubtful	Contains much glucose and salicylic acid	25021	74	35	32

23925, 23934, 24405, 24925 and 25021. Of these samples, 20431, 23925, 23934 and 25021 contain salicylic acid; and 23290, 23925, 23934 and 24925 contain aniline dyes. No. 20429 is a genuine fruit jelly, but contains salicylic acid. This is quite unnecessary to the preservation of the article, which contains enough sugar for that purpose; and was probably added to the fruit, to give it keeping qualities, until it could be worked up into jelly.

The adulterated samples may be more definitely classified as follows:—

Containing glucose, preservatives and dyes, Nos. 23925, 23934.
Containing glucose and preservatives, Nos. 20431, 25021.
Containing glucose and dyes, Nos. 23290, 24,925.
Containing preservative, No. 20429
Containing glucose, No. 24405.

A. McGILL.

Erratum.

An error in calculation made the residual cane sugar readings too low by one half. This has been corrected in the present edition.

Addendum.

No attempt was made in the first edition of this bulletin, to determine the percentage amount of glucose present in jams and jellies. This was because no data existed upon which to base a definite opinion.

With a view to establishing such a basis for judgment, four (4) samples of glucose, such as is employed by jam manufacturers, have been subjected to analysis. These are:—

A. Four Star Brand, supplied by J. B. Perreault, Montreal.
B. Five Star Brand, supplied by The Lamoureau Co., Montreal.
C. Sample from Imperial Starch Co., Prescott, Ont.
D. Sample from Edwardsburg Starch Co., Cardinal, Ont.

The following table shews the results of work done on these samples :—

Sample.	Dry Solids.	Water.	Specific Gravity[1].	Polarization.[2]			Extraction of Dry Solids by Alcohol.[3]		Polarimeter reading of ppte by alcohol.[4]	Corresponding dextrin, p.c.[5]	Remarks.
				Direct.	Invert.	Difference.	Soluble.	Insoluble.			
A. . . .	80·8	19·2	1·4856	+159°	+157°	—2°	71·5	9·3	+ 90°	7·8	
B. . . .	76·1	23·9	1·4546	+156°	+153°	—3°	62·8	13·3	+ 86°	7·4	
C . . .	80·0	20·0	1·4834	+176°	+175°	—1°	64·9	15·1	+170°	14·7	
D. . . .	79·1	20·9	1·4749	+184°	+176°	—8°	52·3	26·8	+240°	20·8	Highest dextrin content.

(1) Determined by calculation from the gravity of a solution of 50 grammes to 100 cc.
(2) Calculated in Soleil-Ventzke sugar degrees, for a solution of 26,048 grammes of the sample in 100 cc.
(3) Alcohol of about 95 per cent strength.
(4) Calculated for a solution of the dextrin, from 100 grammes of the sample, dissolved to 100 cc. — and expressed in S.-V. sugar degrees.
(5) A solution of 26 grammes pure dextrin to 100 cc. reads nearly 300 S.-V. sugar degrees.

It will be seen that these samples vary in dextrin content from about 7 to nearly 21 per cent, so that a table of interpretation calculated for any given sample would give more or less erroneous results if applied to any other sample.

The following tables are constructed for the glucoses A and D, representing extremes of character.

A sample of commercial cane sugar dissolved 26,048 g. to 100 cc.—read at 20° C :—

Before inversion	+	98·8°
After inversion	−	30·6°
Total change	=	129·4° (Taken as 130°)

Glucose sample A, on a basis of dry matter, gave, on similar treatment :—

Before inversion	+	199°
After inversion	+	196°
Total change	=	3°

Glucose sample D, gave :—

Before inversion	+	230°
After inversion	+	220°
Total change	=	10°

The formulas for construction of these tables are :—

Table—Cane sugar and glucose A—1·96b − ·3a
" " " D—2·2b − ·3a
a = percentage cane sugar.
b = percentage dry glucose.

CANE SUGAR AND GLUCOSE, SAMPLE A.

Cane Sugar.	Glucose A—Dry.	Glucose A—with 20% water.	Reading after inversion.	Remarks.
100	0	0	30°	Experimental numbers obtained by work on known mixtures, are in fairly close accordance with those derived by calculation.
90	10	12	7·4	
80	20	24	+ 15·2	
70	30	36	+ 37·8	
60	40	48	+ 60·4	
50	50	60	+ 83·0	
40	60	72	+105·6	
30	70	84	+128·2	
20	80	96	+150·8	
10	90	108	+173·4	
0	100	120	+196·0	

CANE SUGAR AND GLUCOSE, SAMPLE D.

Cane Sugar.	Glucose D—Anhydrous.	Glucose D—with 20 water.	Reading after inversion.	Remarks.
100	0	0	30°	See note above.
90	10	12	5	
80	20	24	+ 20	
70	30	36	+ 45	
60	40	48	+ 70	
50	50	60	+ 95	
40	60	72	+120	
30	70	84	+145	
20	80	96	+170	
10	90	108	+195	
0	100	120	+220	

It will be noted by comparison of these tables, that an approximation to the amount of glucose originally present in the jam, can be made within five or ten per cent. The percentages given in the Analytical tables, do not profess to greater exactitude than this.

A. McGILL.

January 19, 1905.

APPENDIX K.

BULLETIN No. 97—FERTILIZERS, 1904.

OTTAWA, July 15, 1904.

W. J. GERALD, Esq.,
Deputy Minister of Inland Revenue.

SIR,—I submit herewith a tabulated statement, marked Table I., containing a description of 111 standard samples of agricultural fertilizers, which were sent in to the Department of Inland Revenue by their manufacturers, importers or vendors, in accordance with the provisions of the Fertilizers Act, 1890, and as representing the goods which it was proposed to offer for sale in Canada during the year 1904. The number of such samples is 111, and shows a diminution compared with the previous year when 128 were submitted.

Table I. gives the designations of the various brands of fertilizers, the names of the manufacturers or importers, the claims made as regards their contents in fertilizing ingredients, and the actual percentages of these found in the standard samples on analysis in this laboratory. The guaranteed contents are given in the upper line, and the analytical results in the second line placed opposite the designation of the fertilizer. In many cases the claims made are imperfect and indefinite, and in some, the requirements of the Act calling for a certificate of analysis, and a statement of the materials used in the manufacture of the fertilizer have been neglected. With regard to indefinite claims it may be stated that these are often made by manufacturers of repute, when, for instance, a particular sample is described as containing 'from 2·5 to 3·0 p.c. of ammonia,' or 'from 8 to 9 p.c. of available phosphoric acid,' or 'from 9·5 to 11 p.c. of potash.' In such instances if an ingredient is found deficient in the sample sold in the open market, and it is challenged, the manufacturer sometimes defends himself by maintaining that his guarantee does not extend above the lowest of the figures mentioned. For this reason the 'guaranteed contents' of a fertilizer, as stated in Table I, must be understood to indicate only the lowest percentage given on the manufacturer's label, or in his correspondence with the department.

As required by the Fertilizers Act, Table I also contains a column in which 'the relative value of each fertilizer calculated from the contents in fertilizing ingredients' is given, the prices of these ingredients being taken as follows :—

	Cents per lb.
Nitrogen in salts of ammonia or nitrates as well as in compound fertilizers	13
Organic nitrogen in ground bone, fish blood or tankage	12
Phosphoric acid :—	
Soluble in water	6
Soluble in 1 p.c. citric acid	$5\frac{1}{2}$
Insoluble in Thomas' Phosphate Powder	$3\frac{1}{2}$
Insoluble in ground rock phosphate and fertilizers generally	$1\frac{1}{2}$
Potash from high grade salts	$5\frac{1}{4}$

The valuation of each brand is calculated on the results of the analysis of the standard samples, but it has been omitted in the case of the guaranteed contents on account of the imperfect character of the information supplied in the majority of cases.

I have also to submit a description of the fertilizer samples which were collected, as sold in the open market, in accordance with your instructions of 14th January last. This description is called Table II. and contains the date of collecting the samples, the names of the vendors and manufacturers, the designation of the brands, and the results of the analysis. The figures obtained in examining the samples as sold are given on the same line which shows the name of the fertilizer. On the second line will be found the particulars of the manufacturers' guarantee, when the brand has been registered. On the third line is given the analysis of the corresponding standard sample, if it has been supplied to the department. In cases where no standard samples have been sent in to the department and nevertheless, in contravention of the Fertilizers Act, the fertilizers have been offered for sale, it has of course not been found possible to give either the guaranteed contents or the analysis of a standard sample. The number of such fertilizers not registered and therefore illegally sold amounts to 24, more than twice as many as in former years. It would appear to be necessary to take some action to suppress this selling of fertilizers, in regard to which the vendors have made no effort to comply with the law.

According to the opinions expressed by the district analysts 13 out of the 96 samples collected have been found to be adulterated according to the Act, being deficient in available phosphoric acid or other fertilizing constituent. Further action under the Act would also seem to be necessary in these cases.

In my report of May 13, 1901 (Bulletin No. 75), the proceedings were fully detailed which led to an alteration in the method of determining the available phosphoric acid in fertilizers, the adoption of which was then authorized by the Commissioner of Inland Revenue. This method has since been carried out in this laboratory, and in those of the district analysts, and has worked very satisfactorily. From its results it would appear that the solubility of the phosphoric acid in non-acidulated samples increases in the following order:—1, bonemeal; 2, tankage; 3, Thomas' Phosphate Powder or basic slag. The "citric soluble" phosphoric acid of our analysis corresponds pretty closely with the "reverted" claimed by United States manufacturers. Since they still continue to mention, in their guarantees, a percentage of "reverted" phosphoric acid, it seems necessary to state that in Canada, a determination of "citric soluble" phosphoric acid is substituted for that of "reverted." The details of the process adopted here for ascertaining the percentage of "available" phosphoric acid contained in agricultural fertilizers will be found in Bulletins 75 and 86.

I beg to recommend the publication of this report, together with Tables I and II as well as the memoranda on manures, which it has been customary to print at the end of the annual Fertilizer Bulletin.

I have the honour to be sir, your obedient servant,

THOMAS MACFARLANE,
Chief Analyst.

TABLE I.—Statement of the Results of Examining 111 Standard

Number of Sample.	Designation.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	—
1492	Essex Complete Manure for Corn, Grain and Grass.	Russia Cement Co.	S. C. Shaffner, Granville Ferry, N.S.	Dry ground fish, ground fish bone, high grade muriate of potash, high grade sulphate of potash, nitrate of soda, dry ground blood, &c.	Guaranteed contents Standard sample....
1493	Essex Complete Manure for Potatoes, Roots and Vegetables.	" ..	" ..		Guaranteed contents Standard sample....
1494	Essex 'A 1' Superphosphate.	" ..	" .	Superphosphate of lime.	Guaranteed contents Standard sample....
1495	Essex XXX Fish and Potash.	" ..	" ..	" ..	Guaranteed contents Standard sample....
1496	Essex Orchard Fertilizer.	" ..	" ..	" ..	Guaranteed contents Standard sample....
1497	Essex Fine Bone Meal.	" ..	" ..	" ..	Guaranteed contents Standard sample....
1498	Essex Market Garden and Potato.	" ..	" ..	" ..	Guaranteed contents Standard sample. ..
1499	Essex Dry Ground Fish.	" ..	" ..	" ..	Guaranteed contents Standard sample...
1500	Fertilizer.....	Laing Packing and Provision Co., Ltd., Montreal.	Manufacturers ...	Blood, offal and tankage from hogs and cattle.	Guaranteed contents Standard sample ...
1501	Fertilizer 'A'.....	Harris Abattoir Co., Ltd.	Edward Adie, Sec'y Treas., Toronto.	Dried blood, bone and tankage.	Guaranteed contents Standard sample....
1502	Fertilizer 'A'.. ...	The Wm. Davis Co., Ltd., Toronto.	Manufacturers ...	" ..	Guaranteed contents Standard sample....
1503	Fertilizer 'C'.....	" ..	"	Tank water condensed and dried.	Guaranteed contents Standard sample....
1504	Reid's Superphosphate.	Thos. Reid, St. John, N.B.	"	....	Guaranteed contents Standard sample...
1505	No. 1 Brand..	Nichols Chemical Co. of Canada, Capelton, Que.	" .. .	Canadian apatite dissolved with sulphuric acid, muriate of potash and sulphate of ammonia.	Guaranteed contents Standard sample....
1506	Reliance....	" ..	"	.. . .	Guaranteed contents Standard sample....
1507	Royal Canadian.....	Nichols Chemical Co. of Canada, Capelton, Que.	Manufacturers....	....	Guaranteed contents Standard sample.
1508	Victor...	" " ..	" ...	....	Guaranteed contents Standard sample....
1509	Crown..... ...	" " .	" ...	....	Guaranteed contents Standard sample....
1510	Capelton Brand. ...	" " ..	" ...	... ...	Guaranteed contents Standard sample....

Samples of Commercial Fertilizers, registered for 1904.

Nitrogen.		Phosphoric Acid.					Potash.	Moisture.	Relative Value per Ton of 2,000 lbs.	Name of Analyst and Number of Sample.
Total including Nitric Acid and Ammonia.	Total Calculated as Ammonia.	Soluble in Water.	Citric Soluble.	Insoluble.	Total.	Total Available.				
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.	
3·30	4·00	3·00	4·00	2·50	9·50	.....	9·50	.....	.....	1492
3·15	3·82	6·20	3·08	1·92	11·20	9·28	9·92	11·05	29 99	J. G. A. Valin.
3·70	1·50	3·00	4·00	2·00	9·00	.....	8·50	.....	.....	1493
4·21	5·35	7·16	1·92	1·79	10·87	9·08	7·24	8·60	30 19	"
.....	1·25	.....	.....	.....	9·00	7·00	2·00	.....	.....	1494
0·87	1·05	1·79	5·69	5·12	12·60	7·48	1·66	5·80	13 82	"
.....	2·50	4·50	4·50	3·00	12·10	.....	2·50	.....	.....	1495
1·51	1·83	5·63	5·05	2·56	13·24	10·68	2·53	10·55	19 63	"
.....	2·00	4·00	3·00	2·00	9·00	.....	8·50	.....	.....	1496
1·84	2·24	3·98	4·15	4·47	12·60	8·13	8·19	6·00	24 01	"
.....	3·00	.....	24·00	.....	24·00	.....	.....	.....	.....	1497
2·24	2·72	.....	12·75	13·48	26·23	12·75	0·30	3·95	24 19	"
2·00	2·40	4·00	4·00	2·00	10·00	.....	5·00	.....	.....	1498
2·10	2·55	4·47	7·23	0·77	12·47	11·70	3·99	8·80	23 14	"
.....	8·00	.....	11·00	.....	11·00	.....	.....	8·00	.....	1499
8·47	10·28	.....	11·32	3·20	14·52	11·32	0·16	9·00	33 89	"
6·23	7·56	.....	.....	.....	13·31	.....	.....	10·61	.....	1500
6·78	8·22	.....	10·88	2·39	13·27	10·88	.....	11·21	28 98	Miss E. Davidson.
9·13	11·08	.....	.....	.....	5·86	.....	.....	6·02	.....	1501
9·60	11·66	.....	4·64	1·43	6·07	4·64	.....	5·84	28 56	"
6·93	8·42	.....	.....	.....	13·72	.....	.....	8·00	.....	1502
6·58	7·99	.....	14·40	1·59	15·99	14·40	.....	6·32	32 10	"
12·83	15·58	.....	.....	.....	2·82	.....	.....	8·42	.....	1503
12·99	15·77	.....	2·71	0·32	3·03	2·71	1·25	8·40	35 56	"
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1504
3·02	3·66	3·16	2·22	5·36	10·74	5·38	2·28	27·46	18 07	"
.....	.....	.....	.....	.....	.....	11·05	.....	.....	.....	1505
None...	None...	9·72	1·48	6·20	17·40	11·20	None..	11 85	15 14	A. Lemoine.
.....	2·00	.....	.....	.....	.....	6·00	2·00	.....	.....	1506
1·68	2·04	6·84	1·35	4·60	12·79	8·19	3·76	10·15	19 36	"
.....	4·00	.....	.....	.....	.....	9·00	5·00	.....	.....	1507
2·80	3·40	7·16	1·48	3·96	12·60	8·64	6·68	9·40	25 68	A. Lemoine.
.....	2·00	.....	.....	.....	.....	7·00	3·00	.....	.....	1508
1·96	2·38	4·15	2·89	2·36	9·40	7·04	4 49	9·75	18 65	"
.....	2·00	.....	.....	.....	.....	11·00	2·50	.....	.....	1509
2·87	3·48	11·00	0·65	2·87	14·52	11·65	3·68	11·90	26 09	"
.....	.....	.....	.....	.....	.....	8·00	.....	.....	.....	1510
None.	None.	4·92	2·34	4·25	11·51	7·26	None.	10·40	9 74	"

TABLE I.—Statement of the Results of Examining 111 Standard Samples

Number of Sample.	Designation.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	
1511	Williams & Clarke American Potato Manure.	American Agricultural Chemical Co., Boston, Mass	Ross L. Coe, Local Treasurer, Boston.	Bone black, animal bone, phosphatic guano, dried fish meat or blood, nitrate of soda or sulphate of ammonia sulphate, or muriate of potash and sulphuric acid.	Guaranteed contents Standard sample....
1512	Pacific Potato Special.	" "	" "	....	Guaranteed contents Standard sample....
1513	Pacific Nobsque Guano.	" "	" "	.....	Guaranteed contents Standard sample....
1514	Pacific Fine Ground Bone.	" "	" "	.....	Guaranteed contents Standard sample....
1515	Soluble Pacific Guano	" "	" "	.....	Guaranteed contents Standard sample ...
1516	Tucker's Imperial Bone Superphosphate.	" "	" "	.....	Guaranteed contents Standard sample ...
1517	Bradley's Eclipse Phosphate.	" "	" "	.....	Guaranteed contents Standard sample....
1518	Bradley's XL Superphosphate of Lime	" "	" "	.....	Guaranteed contents Standard sample....
1519	Bradley's Potato Fertilizer.	" "	" "	.....	Guaranteed contents Standard sample....
1520	Bradley's Farmers New Method Fertilizer.	" "	" "	.....	Guaranteed contents Standard sample....
1521	Bradley's Fine Ground Bone.	" "	" "	.....	Guaranteed contents Standard sample....
1522	Read's Standard Superphosphate.	" "	" "	.....	Guaranteed contents Standard sample ...
1523	Read's Practical Potato Special.	" "	" "	.....	Guaranteed contents Standard sample....
1524	Read's Sure Catch Fertilizer.	" "	" "	.....	Guaranteed contents Standard sample ...
1525	Quinnipiac Climax Phosphate for all crops.	" "	" "	.....	Guaranteed contents Standard sample...
1526	Cumberland Superphosphate.	" "	" "	.....	Guaranteed contents Standard sample....
1527	Cumberland Potato Fertilizer.	" "	" "	.....	Guaranteed contents Standard sample....
1528	Cumberland Fine Ground Bone.	" "	" "	.....	Guaranteed contents Standard sample.
1529	Great Eastern High Grade Special Potato Manure.	American Agricultural Chemical Society.	Great Eastern Fertilizer Branch. Rutland, Vt.	.....	Guaranteed contents Standard sample ...
1530	Great Eastern Northern Corn Special.	" "	" "	.....	Guaranteed contents Standard sample..
1531	Great Eastern Potato Manure.	" "	" "	.....	Guaranteed contents Standard sample....
1532	Great Eastern General Fertilizer.	" "	" "	.....	Guaranteed contents Standard sample....

of Commercial Fertilizers, registered for 1904—*Continued.*

RESULTS OF ANALYSIS.

Nitrogen.		Phosphoric Acid.					Potash.	Moisture.	Relative value per ton of 2,000 lbs.	Name of Analyst and Number of Sample.
Total including that of Nitric Acid and Ammonia.	Total calculated as Ammonia.	Soluble in Water.	Citric Soluble.	Insoluble.	Total.	Total Available.				
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	Cts.	
2·06	2·50	5·00	3·00	2·00	10·00	8·00	3·00	.....	.....	1511
1·89	2·29	6·72	2·37	1·79	10·88	9·09	2·16	13·10	18·36	J. G. A. Valin.
2·06	2·50	5·00	3·00	2·00	10·00	8·00	3·00	.....	.....	1512
1·90	2·31	6·20	2·75	2·05	11·00	8·95	2·16	13·45	18·27	"
1·03	1·25	6·00	2·00	2·00	10·00	8·00	2·00	.....	.....	1513
1·05	1·27	6·08	3·01	1·79	10·88	9·09	1·74	9·80	15·68	"
2·50	3·00	.....	.....	.....	21·00	.....	.....	.....	.....	1514
2·53	3·19	.....	12·79	6·72	19·51	12·79	.....	6·25	22·14	"
2·06	2·50	5·00	3·00	2·00	10·00	8·00	1·50	.....	.....	1515
2·10	2·55	6·52	2·44	2·36	11·32	8·96	1·83	13·15	18·58	A. Lemoine.
1·03	1·25	6·00	2·00	2·00	10·00	8·00	2·00	.....	.....	1516
1·26	1·53	6·20	3·08	2·23	11·51	9·28	2·43	10·90	17·30	"
1·03	1·25	6·00	2·00	2·00	10·00	8·00	2·00	.....	.....	1517
1·26	1·53	6·52	2·57	2·55	11·64	9·09	2·27	10·65	17·05	"
2·06	2·50	5·00	3·00	2·00	10·00	8·00	1·50	.....	.....	1518
2·12	2·58	6·20	3·40	1·91	11·51	9·60	1·75	13·45	19·09	"
2·06	2·50	5·00	3·00	2·00	10·00	8·00	3·00	.....	.....	1519
2·10	2·55	6·20	2·89	2·23	11·32	9·09	2·95	13·85	19·82	"
1·03	1·25	6·00	2·00	2·00	10·00	8·00	2·00	.....	.....	1520
1·08	1·31	7·84	2·24	2·39	12·47	10·08	4·51	9·52	20·03	Miss E. Davidson.
2·50	3·00	.....	.....	.....	21·00	.....	.....	.....	.....	1521
2·91	3·53	.....	14·72	6·07	20·79	14·72	.....	5·80	24·99	"
0·82	1·00	5·00	3·00	2·00	10·00	8·00	4·00	.....	.....	1522
1·07	1·30	7·19	3·85	2·07	13·11	11·04	5·90	9·00	22·44	Miss E. Davidson.
0·82	1·00	2·00	2·00	1·00	5·00	4·00	8·00	.....	.....	1523
1·03	1·25	3·04	2·72	1·28	7·04	5·76	8·79	9·16	18·81	"
.....	.....	6·00	4·00	1·00	11·00	10·00	2·00	.....	.....	1524
0·56	0·68	10·36	1·60	2·11	14·07	11·96	2·35	7·45	18·73	J. G. A. Valin.
1·03	1·25	6·00	2·00	2·00	10·00	8·00	2·00	.....	.....	1525
0·98	1·19	7·04	1·72	2·56	11·32	8·76	0·80	9·55	14·47	
2·06	2·50	5·00	3·00	2·00	10·00	8·00	1·50	.....	.....	1526
1·96	2·38	6·40	3·64	2·11	12·15	10·04	1·79	12·10	19·27	"
2·06	2·50	5·00	3·00	2·00	10·00	8·00	3·00	.....	.....	1527
2·52	3·06	6·85	2·55	2·11	11·51	9·40	2·14	13·40	20·44	"
2·50	3·00	.....	.....	.....	21·00	.....	.....	.....	.....	1528
2·03	2·46	.....	13·30	6·72	20·02	13·30	.....	5·90	21·51	"
3·30	4·00	4·00	2·00	1·00	7·00	6·00	10·00	.....	.....	1529
3·30	4·01	3·71	3·20	1·08	7·99	6·91	9·57	8·80	26·91	A. Lemoine.
2·06	2·50	5·00	3·00	1·00	10·00	8·00	1·50	.....	.....	1530
2·24	2·72	5·95	4·41	1·28	11·64	10·36	1·62	12·35	19·89	"
2·06	2·50	5·00	3·00	1·00	10·00	8·00	3·00	.....	.....	1531
1·10	2·55	6·07	3·53	1·40	11·00	9·60	3·03	13·60	20·22	
0·82	1·00	5·00	3·00	1·00	10·00	8·00	4·00	.....	.....	1532
1·30	1·58	5·88	4·16	1·28	11·32	10·04	4·53	8·75	20·13	"

TABLE I.—Statement of the results of Examining 111 Standard Samples

Number of Sample.	Designation.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	——
1533	Great Eastern Grass and Oats Fertilizer.	American Agricultural Chemical Society.	Great Eastern Fertilizer Branch, Rutland, Vt.	.....	Guaranteed contents Standard sample....
1534	Superphosphate of Lime.	Standard Fertilizer and Chemical Co., Smiths' Falls.	R. J. Brodie, Smiths' Falls.	Mineral Phosphate	Guaranteed contents Standard sample....
1535	Special Fertilizer ...	" " ..	" " ..	Nitrate of Soda Sulphate of Ammonia Potash and Magnesia Salts and Mineral Superphosphates.	Guaranteed contents Standard sample....
1536	Standard Fertilizer..	" " .	" " ..	" " ..	Guaranteed contents Standard sample.. .
1537	Star Fertilizer.....	" " ..	" " ..	" " ..	Guaranteed contents Standard sample....
1538	No. 1 Fertilizer... .	" " ..	" " ..	" " ..	Guaranteed contents Standard sample....
1539	Royal Fertilizer.....	" " ..	" " ..	" " ..	Guaranteed contents Standard sample....
1540	Nitrate of Soda.....	" " ..	" " ..	.....	Guaranteed contents Standard sample....
1541	Swift's Lowell Bone Fertilizer.	Lowell Fertilizer Co., Boston, Mass.	Benj. Moody, Agt.	Blood, meat, bone, bone black, bone phosphate.	Guaranteed contents Standard sample....
1542	Swift's Lowell Potato Manure	" " ..	" " .	Nitrate of soda, sulphate of ammonia.	Guaranteed contents Standard sample....
1543	Swift's Lowell Potato Phosphate.	" " ..	" " .	Sulphate or muriate of potash.	Guaranteed contents Standard sample ...
1544	Swift's Lowell Ground Bone.	" "	" " ..	.....	Guaranteed contents Standard sample . .
1545	Swift's Lowell Animal Brand.	" " .	" " .	.....	Guaranteed contents Standard sample....
1546	The New England Corn Phosphate.	The New England Fertilizer Co., Boston, Mass.	A. P. Clarke, Agt., Boston.	Blood, meat, bone, bone black, bone phosphate, nitrate of soda or sulphate of ammonia.	Guaranteed contents Standard sample....
1547	The New England Potato Fertilizer.	" "	" " ..	" " ..	Guaranteed contents Standard sample....
1548	The New England Corn and Grain Fertilizer.	" "	" " ..	Sulphate or muriate of potash.	Guaranteed contents Standard sample....
1549	Ingersoll Fertilizer "A."	Ingersoll Packing Co., Ingersoll, Ont.	C. S. Wilson, Manager, Ingersoll.	.....	Guaranteed contents Standard sample....
1550	Freeman's Sure Growth Manure.	The W. A. Freeman Co., Ltd., Hamilton.	W. A. Freeman...	Phosphate, bone, blood, tankage, sulphuric acid,	Guaranteed contents Standard sample....
1551	Bone and Potash..	" "	" " ..	Muriate of potash, sulphate of potash, sulphate of ammonia and nitrate of potash.	Guaranteed contents Standard sample....

of Commercial Fertilizers, registered for 1904.—*Continued.*

Results of Analysis.

Nitrogen.		Phosphoric Acid.					Potash.	Moisture.	Relative value per ton of 2,000 lbs	Name of Analyst and Number of Sample.
Total including Nitric Acid and Ammonia.	Total calculated as Ammonia.	Soluble in Water.	Citric Soluble.	Insoluble.	Total.	Total Available.				
p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	$ cts.	
.....	.....	6·00	5·00	1·00	12·00	11·00	2·00	.....	.....	1533
.....	.....	9·40	2·76	1·40	13·56	12·16	2·29	7·70	17·13	"
.....	.....	.....	.....	.....	16·00	14·00	.....	.....	.....	1534
0·14	0·17	10·04	1·99	4·60	16·63	12·03	....	10·75	15·96	J. G. A. Valin.
.....	3·50	.....	.....	.....	10·00	8·00	6·00	.....	.....	1535
3·15	3·82	7·35	0·78	2·75	10·88	8·13	7·00	8.55	26·03	"
.....	2·50	.....	.....	.....	11·00	9·00	2·00	.....	.....	1536
2·52	3·06	7·16	1·15	3·65	11·96	8·31	2·08	8·50	19.67	"
.....	2·00	.....	.....	.....	6·00	5·00	2·00	.....	.....	1537
1·82	2·21	4·15	0·58	1·67	6·40	4·73	1·64	3·85	12·56	J. G. A. Valin.
.....	2·00	.....	.....	.....	11·00	9·00	1·25	.....	.....	1538
1·78	2·16	6·40	1·08	4·48	11·96	7·48	1·64	9·40	16·54	"
.....	2·00	.....	.....	.....	9·00	8·00	3·00	.....	.....	1539
1·94	2·36	5·11	2·37	2·43	9·91	7·48	3·09	8·27	18·73	A. Lemoine.
.....	18·05	.....	.....	.....	.....	.....	.....	.....	.....	1540
14·92	18·12	.....	.....	.....	.....	.....	.....	2·35	38·79	"
.....	2·00	.....	.....	.....	9·00	8·00	3·00	.....	.....	1541
1·79	2·17	3·34	5·45	0·80	9·59	8·79	3·05	10·35	18·08	"
.....	2·00	.....	.....	.....	8·00	7·00	4·00	.....	.....	1542
1·79	2·17	4·79	1·92	0·96	7·67	6·71	5·04	10·90	17·17	"
.....	3·00	.....	.....	.....	9·00	8·00	6·00	.....	.....	1543
2·73	3·31	4·03	4·28	1·15	9·46	8·31	6·08	8·65	23·34	"
.....	3·00	.....	.....	.....	.....	.....	.....	.....	.....	1544
2·59	3·14	.....	11·07	12·79	26·86	14·07	....	3·16	25·51	Miss E. Davidson.
.....	3·00	.....	.....	.....	10·00	9·00	4·00	.....	.....	1545
2·28	2·79	8·15	2·57	1·75	12·47	10·72	4·13	11·08	23·37	"
.....	2·00	.....	.....	.....	9·00	8·00	3·00	.....	.....	1546
2·75	3·34	5·27	4·17	1·43	10·87	9·44	3·43	9·08	22·07	"
.....	2·00	.....	.....	.....	8·00	7·00	4·00	.....	.....	1547
1·93	2·34	5·91	1·92	0·96	8·79	7·83	5·50	10·72	20·26	"
.....	1·50	.....	.....	.....	8·00	7·00	2·00	.....	.....	1548
1·02	1·24	6·71	0·81	0·95	8·47	7·52	1·79	10·20	13·44	"
.....	9·00	.....	5·50	6·80	.....	.....	..	8·00	.....	1549
7·00	8·50	Trace...	9·31	0·60	9·91	9·31	.....	12·50	27·22	A. Lemoine.
.....	3·50	.....	.....	.....	8·00	....	3·00	.....	.....	1550
2·94	3·57	5·75	3·53	6·39	15·67	9·28	3·07	11·75	23·55	"
.....	2·00	.....	.....	.....	9·00	.....	6·00	.....	.....	1551
2·24	2·72	6·07	3·21	5·11	14·39	9·28	6·95	9·70	25·45	"

TABLE I.—Statement of the Results of Examining 111 Standard

Number of Sample.	Designation.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	—
1552	Celery and Early Vegetable Manure.	The W. A. Freeman Co., Ltd., Hamilton.	W. A. Freeman..	Muriate of potash, sulphate of potash, sulphate of ammonia and nitrate of potash.	Guaranteed contents. Standard sample....
1553	Phosphate Powder.	" " . " " ..	" " ..		Guaranteed contents. Standard sample....
1554	Freeman's Potato Manure.	" " .. " "	" " ..		Guaranteed contents. Standard sample....
1555	Freeman's Tankage Manure.	" " . " " .	" " ..		Guaranteed contents. Standard sample....
1556	Freeman's Tobacco Manure.	" " . " " .	" " ..		Guaranteed contents. Standard sample....
1557	Freeman's Pure Bone Meal.	" " . " " ..	" " ..		Guaranteed contents. Standard sample .
1558	Brand H Fertilizer..	W. Harris & Co., Toronto.	Manufacturers....	Blood, Flesh and Bone.	Guaranteed contents. Standard sample...
1559	Bone Meal.. . ..	" " .. " " ..		Crude Bone...	Guaranteed contents. Standard sample....
1560	Potato Phosphate...	Provincial Chemical Fertilizer Co., St. John, N.B.	" "		Guaranteed contents. Standard sample ..
1561	Imperial Superphosphate	" " " " ..	....		Guaranteed contents. Standard sample....
1562	Victor Guano	" " " " ..	..... .		Guaranteed contents. Standard sample ...
1563	Bone Meal	" " " " ..	.. ..		Guaranteed contents. Standard sample....
1564	Bone, Blood and Potash.	" " " "	....		Guaranteed contents. Standard sample....
1565	Potato Phosphate...	The Nova Scotia Fertilizer Co., Halifax, N.S.	C. M. Jack, Mn'g'r		Guaranteed contents. Standard sample ...
1566	Ceres Superphosphate.	" " . " " ..	....		Guaranteed contents. Standard sample...
1567	Bone Meal	" " " " ..	... ...		Guaranteed contents Standard sample....
1568	Fruit Tree Fertilizer	" " . " "	....		Guaranteed contents Standard sample....
1569	Blood, Bone and Potash.	" " " "	....		Guarenteed contents Standard sample....
1570	High Grade Southern Guano.	" " . " "	....		Guaranteed contents Standard sample....
1571	Bone and Potash....	" " " "	. ...		Guaranteed contents Standard sample....
1572	Bradleys New Method Fertilizer.	American Agricultural Chemical Co., Boston.	Buffalo Sales Dept..		Guaranteed contents Standard sample...
1573	Bradleys B. D. Sea Fowl Guano.	" " .. " "	. ...		Guaranteed contents Standard sample ..
1574	Bradleys Complete Manure for Potatos and Vegetables.	" " " " .	....		Guaranteed contents Standard sample....
1575	Crokers Wheat and Corn Fertilizer.	" " . "	....		Guaranteed contents Standard sample. ..

Samples of Commercial Fertilizers, registered for 1904 *Continued.*

Results of Analysis.

Nitrogen.		Phosphoric Acid.					Potash.	Moisture.	Relative value per ton of 2,000 lbs.	Name of Analyst and Number of Sample.
Total including Nitric Acid and Ammonia.	Total calculated as Ammonia.	Soluble in Water.	Citric Soluble.	Insoluble.	Total.	Total Available.				
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.	
.....	6·00	.....	.....	.....	9·00	.....	6·00	.....	.....	1552
5·29	6·42	4·99	3·52	3·83	12·34	8·51	7·61	8·80	32 76	A. Lemoine.
.....	.....	.....	.....	.....	15·00	.....	.....	.....	.....	1553
.....	.....	9·59	4·29	4·03	17·91	13·88	.....	6·65	17·41	"
.....	3·00	.....	.....	.....	8·00	.....	5·00	.....	.....	1554
2·64	3·21	6·23	2·08	5·28	13·59	8·31	5·79	10·20	24 26	Miss E. Davidson.
.....	5·00	.....	.....	.....	12·00	.....	.....	.....	.....	1555
5·67	6·88	0·00	12·16	3·83	15·99	12·16	.....	9·84	28 11	"
.....	6·00	.....	.....	.....	7·00	.....	7·00	.....	.....	1556
5·30	6·44	5·11	3·05	3·99	12·15	8·16	6·89	7·20	31 68	"
.....	8·00	.....	.....	.....	23·00	.....	.....	.....	.....	1557
3·43	4·16	.....	15·51	9·75	25·26	15·51	.....	5·96	28 21	"
.....	9·32	.....	.....	.....	7·16	.....	.....	.....	.....	1558
6·86	8·33	.....	5·12	2·87	7·99	5·12	1·15	9·52	25 52	"
.....	5·41	.....	.....	.....	20·15	.....	.....	.....	.....	1559
4·66	5·66	.....	14 10	5 27	19 67	14·40	.....	3·12	28·60	"
.....	2 50	.....	.....	.....	.....	8·00	6·50	.....	.....	1560
2·38	2·89	7·80	1 97	3 98	13·75	9·77	5 33	7·10	24·48	J. G. A. Valin.
.....	3 00	.....	.....	.....	.....	10·50	1·50	.....	.....	1561
2 52	3·06	7·22	4 70	5 95	17 87	11·92	1·85	8 60	23·57	"
.....	2·00	.....	.....	.....	.....	7·00	2·50	.....	.....	1562
2·00	2·43	7·04	3 70	6·53	17·27	10·74	1 54	8·20	21 27	"
.....	3·10	.....	.....	.....	24·14	.....	.....	.....	.....	1563
2·12	2·58	.....	15·48	5·76	21·24	15·48	.....	8·85	24·25	"
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1564
2·17	2·63	7·16	4·16	6·08	17·40	11·32	4·46	9·70	25·30	"
.....	3·75	.....	.....	.....	.....	10 00	6·00	.....	.....	1565
3·24	3 94	10·55	0·65	1 59	12 79	11 20	7·70	11 55	30·34	A. Lemoine.
.....	2·08	.....	.....	.....	.....	.....	2·41	.....	.....	1566
2·80	3·40	9·78	1·28	1 28	12·34	11·06	7·04	13·50	28·18	"
.....	3 00	.....	.....	.....	.....	.....	.....	.....	.....	1567
3·94	4 79	.....	9·60	12·47	22·07	9·60	.....	6 75	23 75	A. Lemoine.
.....	3 00	.....	.....	.....	.....	8·00	6·00	.....	.....	1568
3·99	4 84	11·38	0·26	0·83	12·47	11·64	6·46	10·95	31 32	"
.....	2·00	.....	.....	.....	.....	7·00	4·00	.....	.....	1569
3·43	4·16	0·40	8·75	6·07	15.22	9·15	4·01	8·00	25 04	"
.....	2 00	.....	.....	.....	.....	7·00	2·50	.....	.....	1570
3 50	4·25	8·96	0·50	1·73	11·19	9·46	4·11	10·25	25 22	J. G. A. Valin.
.....	2 00	.....	.....	.....	11·00	.....	2·00	.....	.....	1571
3·50	4 25	0·49	7·49	6·09	14·07	7·98	2·78	5·04	22 64	
0·82	1 00	6·00	2·00	1·00	9·00	8·00	2·00	.....	.....	1572
0·91	1·10	6·85	0·69	3 65	11·19	7·54	3·34	11·30	15 92	
2 06	2 50	6·00	2 00	1·00	9·00	8·00	1·50	.....	.....	1573
2·10	2·55	6·85	1·01	3·33	11·19	7·86	1·52	9·80	17 37	
3·29	4·00	6·00	2·00	1·00	9·00	8·00	7·00	.....	.....	1574
3·36	4·08	6·09	2·74	3·00	11·83	8·83	7·33	8·75	27 72	
2·06	2·50	6 00	2·00	1·00	9·00	8·00	1·50	.....	.....	1575
2·10	2·55	6·21	1·79	3 00	11 00	8·00	1·50	10·30	17 34	

TABLE I.—Statement of the results of examining 111 Standard Samples

Number of Sample.	Designation.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	—
1576	Crokers Cabbage Potato Manure.	American Agricultural Chemical Co., Boston.	Buffalo Sales Dept., Buffalo.	.....	Guaranteed contents Standard sample....
1577	Crokers Harvest Jewel Fertilizer.	" " .. " " .	.....		Guaranteed contents Standard sample....
1578	Crokers Ammoniated Bone Superphosphate.	" " .. " " .	.....		Guaranteed contents Standard sample....
1579	Eureka..... ...	Pidgeon Fertilizer Co., Ltd., Windsor, C.S.	Robt. Pidgeon Manager.	Bone, Rock Phosphate, Animal Matter, Potash, Nitrate of Soda and Sulphuric Acid.	Guaranteed contents Standard sample...
1580	Intense Brand	" " . " .	" " .		Guaranteed contents Standard sample....
1581	Potato Manure	" " .. " " ..	" " ..		Guaranteed contents Standard sample....
1582	Ground Bone.....	" " .. " " ..	.....		Guaranteed contents Standard sample ...
1583	Thomas' Phosphate Powder.	Chemical Works, late H. & E. Albert, Biebrich on Rhine.	The Anglo Canadian Chem. Co., St. John, N.B.	.....	Guaranteed contents Standard sample...
1584	Albert's Concentrated Soluble Horticultural Manure, Brand A. G.	" " .. " " ..	.....		Guaranteed contents Standard sample ..
1585	Fertilizer "A".....	Victoria Chemical Co., Ltd., Victoria, B.C.	John A. Hall, Treasurer, Victoria.	Nitrate of soda, muriate of potash and superphosphate of lime	Guaranteed contents Standard sample...
1586	Fertilizer "B".....	" " .. " " ..	" " ..		Guaranteed contents Standard sample ...
1587	Fertilizer "C".....	" " .. " " ..	Muriate of potash and superphosphate of lime.		Guaranteed contents Standard sample....
1588	Superphosphate of Lime.	" " .. " " ..	Treating bone char with sulphuric acid.		Guaranteed contents Standard sample....
1589	Nitrate of Soda.....	" " . " " ..	.....		Guaranteed contents Standard sample ...
1590	Kainite.	" " .. " " ..	.....		Guaranteed contents Standard sample....
1591	Sulphate of Potash..	" " . " " ..	.....		Guaranteed contents Standard sample ..
1592	Muriate of Potash.	" " .. " " ..	.....		Guaranteed contents Standard sample ...
1593	Thomas' Phosphate Powder.	" " .. " " .	.....		Guaranteed contents Standard sample ...

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of Commercial Fertilizers, registered for 1904—*Continued.*

Results of Analysis.

Nitrogen.		Phosphoric Acid.					Potash.	Moisture.	Relative value per ton of 2,000 lbs	Name of Analyst and Number of Sample.
Total including Nitric Acid and Ammonia.	Total calculated as Ammonia.	Soluble in Water.	Citric Soluble.	Insoluble.	Total.	Total Available.				
p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	$ cts.	
2·47	3·00	6·00	2·00	1·00	9·00	8·00	6·00	.....	.....	1576
2·63	3·19	6·55	1·61	2·87	11·03	8·16	5·98	12·20	23·59	Miss. E. Davidson.
1·65	2·00	6·00	2·00	1·00	9·00	8·00	2·60	.....	.....	1577
1·82	2·21	6·23	2·57	2·55	11·35	8·80	2·58	10·40	18·48	"
2·47	3·00	6·00	3·00	2·00	11·00	9·00	2·00	.....	.....	1578
2·67	3·24	6·71	2·57	2·87	12·15	9·28	2·89	13·60	21·70	"
.....	2·50	.....	.....	.....	8·00	.....	1·50	.....	.....	1579
1·90	2·31	6·55	1·83	1·91	10·29	8·38	2·54	14·84	18·04	"
.....	3·50	.....	.....	.....	7·00	.....	4·50	.....	.....	1580
2·52	3·06	5·59	1·77	2·39	9·75	7·36	5·01	13·26	21·16	"
.....	3·00	.....	.....	.....	8·00	.....	4·00	.....	.....	1581
2·59	3·14	6·27	2·23	0·96	9·46	8·50	4·05	14·10	21·23	A. Lemoine.
.....	3·00	.....	.....	.....	20·00	.....	.....	.....	.....	1582
3·78	4·59	.....	11·84	11·51	23·35	11·84	.....	2·50	25·54	"
.....	.....	.....	.....	.....	18·00	.....	.....	.....	.....	1583
.....	.....	.....	16·64	2·87	19·51	16·64	.....	0·15	20·30	"
12·32	.....	11·30	.....	.....	.....	.....	19·71	.....	.....	1584
12·32	14·96	11·70	0·45	.....	12·15	12·15	19·92	1·90	66·98	"
1·00	.....	.....	.....	.....	10·00	.....	7·00	.....	.....	1585
3·78	4·59	11·51	1·15	Trace.	12·66	12·66	7·04	11·80	32·28	"
3·50	.....	.....	.....	.....	9·00	.....	11·00	.....	.....	1586
3·57	4·33	10·74	0·77	Trace.	11·51	11·51	10·75	12·00	34·28	"
.....	.....	.....	.....	.....	12·50	.....	11·00	.....	.....	1587
Trace.	.....	13·30	1·60	Trace.	14·90	14·90	10·75	11·95	29·00	"
.....	.....	.....	.....	.....	16·00	.....	.....	.....	.....	1588
.....	.....	17·59	0·19	Trace.	17·78	17·78	.....	11·20	21·30	"
16·00	.....	.....	.....	.....	.....	.....	.....	.....	.....	1589
15·26	18·52	.....	.....	.....	.....	.....	.....	3·00	39·67	"
.....	.....	.....	.....	.....	.....	.....	12·00	.....	.....	1590
.....	.....	.....	.....	.....	.....	.....	11·95	11·95	12·58	"
.....	.....	.....	.....	.....	.....	.....	50·00	.....	.....	1591
.....	.....	.....	.....	.....	.....	.....	47·16	2·30	49·51	"
.....	.....	.....	.....	.....	.....	.....	50·00	.....	.....	1592
.....	.....	.....	.....	.....	.....	.....	46·64	5·45	19·30	"
.....	.....	.....	.....	.....	15·00	.....	.....	.....	.....	1593
.....	.....	.....	13·24	5·95	19·19	13·24	.....	0·25	18·72	"

TABLE I.—Statement of the Results of Examining 111 Standard

Number of Sample.	Designation.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	—
1594	Homestead Bone Black Fertilizer.	Michigan Carbon Works, Detroit, Mich.	Wm. H. Burtenshaw, Secretary-Treas., Detroit.	....	Guaranteed contents Standard sample . .
1595	Homestead Potato and Tobacco Fertilizer.	" " ..	" " ..	.....	Guaranteed contents Standard sample....
1596	Dessicated Bone....	" " ..	" " ..	.....	Guaranteed contents Standard sample ...
1597	Pure Animal Bone and Potash.	" " ..	" " .	.....	Guaranteed contents Standard sample....
1598	Gregory's Special Tobacco Guano.	" " ..	" " .	.....	Guaranteed contents Standard sample....
1599	Burris' Fertilizer ...	F. D. Burris, near Truro, N.S.	Manufacturer ...	Potash, nitrate of soda, dissolved bone, using plaster and black mud for a face.	Guaranteed contents Standard sample....
1600	Pure Ground Bone..	" " ..	" " ..	.....	Guaranteed contents Standard sample....
1601	Genuine Peruvian Guano.	Rufus R. Gage, Importer, Hamilton, Ont.	R. R. Gage.....	Seabird excreta, etc.	Guaranteed contents Standard sample...
1602	Fertilizer. ...	Joseph O'Hara, Palmerston, Ont.	Manufacturer ...	Slaughter house refuse and by-products.	Guaranteed contents Standard sample....

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Samples of Commercial Fertilizers, registered for 1904—*Concluded.*

Results of Analysis.										
Nitrogen.		Phosphoric Acid.								
Total including Nitric Acid and Ammonia.	Total calculated as Ammonia.	Soluble in Water.	Citric Soluble.	Insoluble.	Total.	Total Available.	Potash.	Moisture.	Relative value per ton of 2,000 lbs	Name of Analyst and Number of Sample.
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.	
2·06	2·50	.....	.....	.....	9·00	8·00	1·50	.....	.....	1594
3·45	2·97	6·74	1·60	2·43	10·74	8·31	1·60	11·80	18·58	A. Lemoine.
2·06	2·50	.....	.....	.....	9·00	8·00	3·00	.....	.....	1595
2·26	2·75	5·63	2·05	1·59	9·27	7·68	4·40	12·50	19·96	"
.....	1·50	.....	.....	.....	25·00	.....	.....	.....	.....	1596
1·40	1·70	.....	7·36	15·03	22·39	7·36	.....	3·15	15·95	"
0·82	1·00	.....	.....	.....	22·00	.....	10·00	.....	.....	1597
0·98	1·19	Trace.	11·33	12·02	23·35	11·33	8·90	2·75	27·97	"
.....	3·00	.....	.....	.....	.....	8·00	4·00	.....	.....	1598
3·01	3·65	11·06	0·33	1·91	13·30	11·39	4·57	15·60	26·81	"
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1599
2·12	2·58	Trace...	2·43	None.	2·43	2·43	6·70	16·40	15·21	"
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1600
4·45	5·40	None...	7·87	14·07	21·94	7·87	Trace.	8·90	23·55	"
.....	2·75	.....	.....	.....	21·00	.....	2·40	.....	.....	1601
2·03	2·46	1·91	12·16	4·67	18·74	14·07	3·74	18·80	26·35	"
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1602
7·56	9·18	Trace...	7·68	1·59	9·27	7·68	Trace.	10·80	28·76	"

TABLE II.—Results of the Examination of 96

Date of Collection.	Name of Sample or Brand.	No. of Sample.	Result of Analysis. Nitrogen. Total in all states.	Nitrogen. Total stated as Ammonia.	Nitrogen. Soluble in Water.	Phosphoric Acid. Citric Soluble.	Phosphoric Acid. Insoluble.	Phosphoric Acid. Total.	Phosphoric Acid. Available.
1904.	*District of Nova Scotia.*		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
April 12	Potato Phosphate, as sold.	20446	2·35	2·86	7·21	0·69	1·95	9·85	7·90
	As guaranteed		.....	3·00	.....	.....	.....	8·00	.....
	Standard sample (1581)		2·59	3·14	6·27	2·23	0·96	9·46	8·50
" 15	Essex Fish and Potash Fertilizer, as sold.	20451	3·19	3·83	2·18	7·49	3·52	13·19	9·67
	As guaranteed		.....	2·50	4·50	4·50	3·00	12·00	.....
	Standard sample (1495)		1·51	1·83	5·63	5·05	2·56	13·24	10·68
" 15	Essex Orchard Brand, as sold	20452	1·60	1·94	1·39	6·16	5·10	12·60	7·75
	As guaranteed		.....	2·00	4·00	3·00	2·00	9·00	.....
	Standard sample (1496)		1·84	2·24	3·98	4·15	4·47	12·60	8·13
" 15	Essex Potato and Market Garden, as sold.	20453	2·38	2·89	3·02	5·87	2·99	11·88	8·89
	As guaranteed		2·00	2·40	4·00	4·00	2·00	10·00	.....
	Standard sample (1498)		2·10	2·55	4·47	7·23	0·77	12·47	11·70
" 15	Bradley's Bone, as sold	20457	2·72	3·30	0·50	11·10	9·28	20·85	11·60
	As guaranteed		2·50	3·00	.....	.....	.....	21·00	.....
	Standard sample (1521)		2·91	3·53	.....	14·72	6·07	20·79	14·72
" 15	Bradley's Potato Fertilizer, as sold.	20458	2·18	2·65	5·47	3·29	2·48	11·24	8·76
	As guaranteed		2·06	2·50	5·00	3·00	2·00	10·00	8·00
	Standard sample (1519)		2·10	2·55	6·20	2·89	2·23	11·32	9·09
" 15	Cumberland Ground Bone, as sold.	20459	2·30	2·79	Trace.	15·57	6·40	21·97	15·57
	As guaranteed		2·50	3·00	.....	.....	.....	21·00	.....
	Standard sample (1528)		2·03	2·46	.....	13·30	6·72	20·02	13·30
" 16	Stockbridge Potato Manure as sold.	20460	3·56	4·32	3·98	1·85	1·60	7·43	5·83
" 16	Potato and Vegetables Phosphate, as sold.	20461	2·07	2·52	7·30	2·24	1·59	11·13	9·54
" 16	Swift Potato Manure, as sold.	20462	1·54	1·87	4·01	3·37	1·09	8·47	7·38
	As guaranteed		.....	2·00	.....	.....	.....	8·00	7·00
	Standard sample (1542)		1·79	2·17	4·79	1·92	0·96	7·67	6·71
	District of Nova Scotia.								
April 20	Ground bone as sold	20468	2·74	3·33	0·52	12·36	6·31	19·19	12·88
	As guaranteed		2·50	3·00	.....	.....	.....	21·00	.....
	Standard sample (1514)		2·53	3·19	.....	12·79	6·72	19·51	12·79
" 20	Pacific Guano Fertilizer as sold.	20469	2·16	2·62	6·12	3·46	1·77	11·35	9·58
	As guaranteed		2·06	2·50	5·00	3·00	2·00	10·00	8·00
	Standard sample		2·10	2·55	6·52	2·43	2·36	11·32	8·96
	District of P.E. Island.								
" 29	Swift Lowell Animal Brand as sold.	24411	2·13	2·58	5·64	2·86	1·32	9·82	8·50
	As guaranteed		.....	3·00	.....	.....	.....	10·00	9·00
	Standard sample (1545)		2·28	2·79	8·15	2·57	1·75	12·47	10·72
" 29	Bowkers Potato and Veg. Phosphate as sold.	24412	1·90	2·31	7·85	2·45	1·61	11·91	10·20

SESSIONAL PAPER No. 14

Samples of Fertilizers as sold in 1904.

Potash.	Moisture.	Relative value per ton of 2,000 lbs	Manufacturer or Furnisher as given by Vendor.	Name and Address of Vendor.	No. of Sample.	Name and Observations of Analyst.
p. c.	p. c.	$ cts.				
Undet.	11·82	20·29	Pidgeon Fertilizer Co., Windsor, N.S.	M. Hebb, Bridgewater, N.S.	20446	Unadulterated; M. Bowman.
4·00	....	....				
4·05	14·10	21·23				
Undet.	8·98	22·80	Russia Cement Co., Gloucester, Mass	S. C. Shaffner, Kentville, N.S.	20451	"
2·50	.....	.....				
2·53	10·55	19·63				
Undet.	6·54	23·04	" ..	" ..	20452	"
8·50	.....	....				
8·19	6·00	24·04				
Undet.	11·92	22·39	" ..	" .	20453	"
5·00	.....	....				
3·99	8·80	23·14				
Undet.	4·87	22·11	Bradley, Boston, Mass.	J. B. Chute, Berwick, N.S.	20457	"
....	....	....				
.....	5·80	24·99				
Undet.	14·44	19·72	" ..	" .	20458	"
3·00	....	.....				
2·95	13·85	19·82				
....	9·88	24·56	American Agricultural Chemical Co., Boston, Mass.	John N. Chute, Berwick.	20459	"
.....	....	.....				
.....	5·90	21·51				
Undet.	11·33	16·53	Bowker, Boston, Mass.	Wolfville Coal Co., Wolfville, N.S.	20460	Not registered
Undet.	15·11	17·07	" ..	" ..	20461	"
Undet.	4·94	17·03	Lowell Fertilizer Co. Lowell, Mass.	R. E. Harris, N.S.	20462	Unadulterated
4·00	....	.....				
5·04	10·90	17·17				
Undetermined.	7·60	22·67	Pacific Guano Co. Boston Mass.	E. M. Walker, Dartmouth, N.S.	20468	"
....	....	....				
	6·25	22·14				
Undet.	18·28	18·85	"	"	20469	"
1·50	.....	.....				
1·83	13·15	18·58				
Undet.	10·12	20·02	Swift Lowell Co. Mass.	A. Horne & Co., Charlottetown.	24411	"
4·60	.....	.....				
4·13	11·08	23·37				
Undet.	15·60	17·53	Bowker Fertilizer Co. Boston.	A. Pickard & Co., Charlottetown.	24412	Not registered

TABLE II.—Results of the examination of 96

Date of collection.	Name of Sample or Brand.	No. of Sample.	Result of Analysis. Nitrogen. Total in all states.	Nitrogen. Total stated as Ammonia.	Nitrogen. Soluble in Water.	Phosphoric Acid. Citric soluble.	Phosphoric Acid. In soluble.	Phosphoric Acid. Total.	Phosphoric Acid. Available.
1904.	*District of P.E. Island*—Con.		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
May 2	Blood Bone and Potash as sold.	24413	2·18	2·65	.....	7·10	2·91	10·01	7·10
	As guaranteed		.....	2·00	.....	.....	.....	.....	7·00
	Standard sample (1569)		3·43	4·16	0·40	8·75	6·07	15·22	9·15
„ 3	Albert Thomas Phosphate Powder.	24414	.....	.....	.....	11·98	6·10	18·11	11·98
	As guaranteed		.....	.....	.....	.....	.....	18·00	.....
	Standard sample (1583)		.....	.....	.....	16·64	2·87	19·51	16·64
3	Kainit	24415	.....	.....	.....	.....	.....	.....	.....
	New Brunswick District.								
April 6	Reid's Superphosphate as sold.	23823	2·88	3·50	1·80	4·20	4·97	10·97	6·00
	Standard sample (1504)		3·02	3·66	3·16	2·22	5·36	10·74	5·38
„ 12	Standard Grade for Grain and Vegetables as sold.	23828	1·71	2·07	7·09	2·59	1·65	11·33	9·68
„ 13	Brand "XL" as sold	23831	2·24	2·72	5·81	3·27	1·79	10·87	9·08
	As guaranteed		2·06	2·50	5·00	3·00	2·00	10·00	8·00
	Standard sample (1518)		2·12	2·58	6·20	3·40	1·91	11·51	9·60
„ 16	Read's Practical Potato special as sold.	23834	1·12	1·36	1·77	2·68	1·10	5·55	4·45
	As guaranteed		0·82	1·00	2·00	2·00	1·00	5·00	4·00
	Standard sample (1523)		1·03	1·25	3·04	2·72	1·28	7·04	5·76
„ 16	Bowker's Potato and Vegetables Phosphate as sold.	23835	1·65	2·01	5·08	3·54	1·66	10·28	8·62
„ 18	Great Eastern General Fertilizer as sold.	23836	1·26	1·53	3·49	4·78	1·84	10·11	8·27
	As guaranteed		0·82	1·00	5·00	3·00	1·00	10·00	8·00
	Standard sample (1532)		1·30	1·58	5·88	4·16	1·28	11·32	10·04
„ 29	Brand "Imperial" as sold.	23853	1·46	1·77	4·40	4·71	6·31	14·71	9·11
	As guaranteed		.....	3·00	.....	.....	.....	.....	10·50
	Standard sample (1561)		2·52	3·06	7·22	4·70	5·95	17·87	11·92
„ 29	Special Potato Phosphate as sold.	23854	1·18	1·43	2·33	4·05	7·66	14·04	7·35
	As guaranteed		.....	2·50	.....	.....	.....	.....	8·00
	Standard sample (1560)		2·38	2·89	7·80	1·97	3·98	13·75	9·77
„ 30	Lowell Animal Brand as sold.	23855	2·44	2·96	5·36	2·71	1·66	9·73	8·07
	As guaranteed		.....	3·00	.....	.....	.....	10·00	9·00
	Standard sample (1545)		2·28	2·79	8·15	2·57	1·75	12·47	10·72
	District of Quebec.								
„ 5	Vegetable and Potato Phosphate, as sold	24601	1·75	2·12	4·78	2·82	2·95	10·55	7·60
„ 5	Bone Phosphate, as sold	24602	0·98	1·19	4·98	3·52	1·39	9·89	8·50
„ 6	„ „	24603	1·40	1·70	5·60	2·66	2·78	11·04	8·26
„ 6	Bowker's Potato Fertilizer (6 per cent) as sold	24604	1·15	1·40	6·00	1·95	2·27	10·22	7·95

SESSIONAL PAPER No. 14

Samples of Fertilizers as sold in 1904—*Continued.*

Potash.	Moisture.	Relative value per ton of 2,000 lbs.	Manufacturer or Furnisher as given by Vendor.	Name and Address of Vendor.	No. of Sample.	Name and Observations of Analyst.
p. c.	p. c.	$ cts.				
Undet.	7·34	18·54	Nova Scotia Fertilizer Co., Halifax, N.B.	A. E. Mutch & Co., Charlottetown.	24413	Unadulterated; M. Bowman.
4·00	.....	.....				
4·01	8·00	25·04				
.....	trace.	17·44	Wallace & Fraser, St. John, N.B....	K. T. Holman, Summerside, P.E.I.	24414	" "
.....	.....	.. ...				
... .	0·15	20 30				
Undet.	17·71	.....		Brace & McKay, Summerside.	24415	Not registered
Undet.	25·62	15 75	Thomas Reid, Parish of Simonds, St. John Co., N.B.	Thomas Reid, Parish of Simonds, St. John Co., N.B.	23823	Unadulterated, M. Bowman.
2·28	27·46	18·07				
Undet.	12·38	16·27	E. Frank Co., New York, U.S.A.	S. B. Hunter, Harvey Station, York County, N.B.	23828	Not registered
Undet.	13·62	18 38	Bradley Fertilizer Co., Boston, Mass., U.S.A.	Henry E. Hill & Co., King Street, St. Stephen, Charlotte Co., N.B.	23831	Unadulterated
1·50	.....	.. ..				
1·75	13·45	19·09				
Undet.	10·52	16·70	The American Agricultural Chemical Co., New York, U.S.A.	J. F. Theriault, Grand Falls, Victoria Co., N.B.	23834	"
8·00	.. ...	....				
8·70	9·16	18·81				
Undet.	14·57	14·76	Bowker Fertilizer Co., Boston and New York, U.S.A.	A. R. Hallett, Grand Falls, Victoria Co., N.B.	23835	Not registered
Undet.	11·16	17 45	The American Agricultural Chemical Co., New York, U.S.A.	Solomen Perley, Woodstock, Carleton Co., B.C.	23836	Unadulterated
4·00	.....	.....				
4·53	8·75	20·13				
Undet.	13·06	17·71	Provincial Chemical Fertilizer Co., Ltd., St. John, N.B.	Sumner Co., Moncton, Westmoreland Co., N.B.	23853	Adulterated, being deficient in ammonia and phosphoric acid, M. Bowman.
1·50	... ...	.....				
1 35	8·60	23 57				
Undet.	19·51	19 41	" ..	" ..	23854	Adulterated, being deficient in ammonia, M. Bowman.
6·50	.....	.....				
5·33	7 10	24·48				
Undet.	11·94	20 44	Swift Lowell Fertilizer Co., Boston, Mass., U.S.A.	Charles Elliot, Moncton, Westmoreland Co., N.B.	23855	Unadulterated
4 00	.....	.....				
4·13	11·08	28·38				
1 90	11·08	15 35	Bowker Fertilizer Co., Boston.	John Leith, Rectory Hill, Megantic ...	24601	Dr. J. T. Donald, not registered.
2·27	10·54	14 37	" ..	" ..	24602	" "
1·86	15·58	16 06	" ..	E. Hebert, Tingwick, Athabaska Co. ...	24603	" "
4·45	14·87	17 68	" ..	J. McMurray, Windsor Mills, P.Q. ..	24604	" "

TABLE II.—Results of the Examination of 96 Samples

Date of Collection.	Name of Sample or Brand.	No. of Sample.	Result of Analysis. Nitrogen. Total, in all states.	Nitrogen. Total stated as Ammonia.	Phosphoric Acid. Soluble in Water.	Phosphoric Acid. Citric Soluble.	Phosphoric Acid. Insoluble.	Phosphoric Acid. Total.	Phosphoric Acid. Available.
1904.	*District of Quebec*—Con.		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
April 7	Bowker's Potato Fertilizer (6 per cent) as sold.	24605	1·15	1·40	4·51	2·91	2·07	9·49	7·42
" 7	Superphosphate with Potash, as sold.	24606	0·17	0·21	7·67	3·06	2·80	13·13	10·73
" 7	Bone Phosphate, as sold.	24607	1·19	1·44	4·40	3·15	2·56	10·11	7·55
" 7	Square Brand, Bone and Potash, as sold.	24608	1·54	1·87	4·84	2·39	2·35	9·58	7·23
" 7	Bone Phosphate, as sold.	24609	1·68	1·31	6·58	1·93	1·57	10·08	8·51
April 7	Superphosphate with Potash.	24610	0·21	0·25	7·60	2·33	2·70	12·63	9·93
" 8	Victor Fertilizer as sold	24611	3·01	3·65	2·68	1·33	4·68	8·69	4·01
	As guaranteed			2·00					7·00
	Standard Sample (1508).		1·96	2·38	4·15	2·89	2·36	9·40	7·04
" 8	Bowkers Vermont Fertilizer as sold.	24612	1·75	2·13	6·65	2·70	2·03	11·38	9·35
" 15	Victor complete Fertilizer as sold.	24613	2·48	3·01	2·81	0·81	5·20	8·82	3·62
	As guaranteed			2·00					7·00
	Standard Sample.		1·96	2·38	4·15	2·89	2·36	9·40	7·04
16	Celery and Early Vegetable Manure as sold.	24614	2·94	3·57	5·72	4·16	4·40	14·28	9·88
	As guaranteed			6·00				9·00	
	Standard Sample (1552).		5·29	6·42	4·99	3·52	3·83	12·34	8·51
16	Sure Growth Manure as sold.	24615	2·41	2·93	6·44	3·35	5·33	15·12	9·70
	As guaranteed			3·50				8·00	
	Standard Sample (1550).		2·94	3·57	5·75	3·53	6·39	15·67	9·28
18	Phosphate Fertilizer as sold	24617	0·07	0·08	9·39	3·83	4·78	18·00	13·22
	As guaranteed							15·00	
	Standard Sample (1553).				9·59	4·29	4·03	17·91	13·88
18	Reliance Fertilizer as sold.	24616	2·10	2·55	3·25	0·68	4·74	8·67	3·93
	As guaranteed			2·60					6·00
	Standard Sample (1506).		1·68	2·04	6·84	1·35	4·60	12·79	8·19
	Montreal District.								
7	Tankage Fertilizer as sold	25125	7·70	9·35	0·73	8·45	2·04	11·22	9·18
	As guaranteed		6·23	7·56				13·31	
	Standard sample (1500).		6·78	8·22		10·88	2·39	13·27	10·88
7	Tankage Fertilizer as guaranteed.	25126	8·82	10·71	0·45	6·41	2·23	9·09	6·86
7	Standard Fertilizer as sold.	25127	2·97	3·61	7·83	1·34	3·27	12·44	9·17
	As guaranteed			2·50				11·00	9·00
	Standard sample (1536).		2·52	3·06	7·16	1·15	3·65	11·96	8·31
" 7	Bone and Potash as sold.	25128	2·66	3·23	6·39	3·28	4·79	14·46	9·67
	As guaranteed			2·00				9·00	
	Standard sample (1551).		2·24	2·72	6·07	3·21	5·11	14·39	9·28
7	Celery and Early Vegetable as sold.	25129	2·94	3·57	6·49	3·42	5·03	14·94	9·91
	As guaranteed			6·00				9·00	
	Standard sample (1552).		5·29	6·42	4·99	3·52	3·83	12·34	8·51

of Fertilizers as sold in 1904—*Continued.*

Potash.	Moisture.	Relative value per ton of 2,000 lbs.	Manufacturer or Furnisher as given by Vendor.	Name and Address of Vendor.	No. of Sample.	Name and Observations of Analyst.
p. c.	p. c.	$ cts.				
5·37	12·52	17 85	Bowker Fertilizer Co., Boston.	D. Watson, Oak Hill Road, Kingsbury.	24605	Dr. J. T. Donald; not registered.
2·34	13·03	16 29	" "	" "	24606	" "
2·15	13·68	14 84	" "	" "	24607	" "
2·18	15·32	15 40	" "	" "	24608	" "
2·08	17·66	15 46	" "	N. Darby, 1st Road of Racine, Ely, P.Q	24609	" "
2 37	13·85	15 51	" "	N. Darby, 1st Road Racine, Ely.	24610	" "
3·56	10 76	17 62	The Nichols Chemical Co., Capleton.	O. C. Selby, Dunham, Missisquoi.	24611	Dr. J. T. Donald; above guarantee in ammonia and potash, but deficient in available phosphoric acid.
3 00	.....	.....				
4·49	9·75	18 65				
4·26	14·92	20 57	Bowker Boston	N. Maynard, Dunham	24612	Dr. J. T. Donald; not registered.
4 05	11·82	16 51	Nichols Chemical Co., Capleton, Que.	S. Vessot, & Co., Joliette, P. Q.	24613	Dr. J. T. Donald; deficient in available phosphoric and above guarantee in ammonia and potash.
3·60	.....	.....				
4 49	9·75	18 61				
4 47	17·01	25 08	W. A. Freeman, Hamilton, Ont.	Eug. Julien, St. Malo de Quebec.	24614	Dr. J. T. Donald; below guarantee in ammonia and potash but far above in phosphoric acid.
6·00	.....	.....				
7·64	8·80	32 76				
1·88	16·14	21 22	" "	" "	24615	Dr. J. J. Donald; below guarantee in potash but far above guarantee in phosphoric acid.
3·00	.....	.....				
3·07	11·75	23 55				
0·61	9·22	17 20	" "	" "	24617	Dr. J. T. Donald; above guarantee.
.....	.....	.....				
.....	6·65	19 36				
1 99	10·59	13 60	Nichols Chemical Co., Capleton, Que.	P. T. Legare, Quebec	24616	Dr. J. T. Donald; below guarantee in available phosphoric acid.
2·00	.....	.....				
3·76	10·15	19·36				
0·19	10·11	30 99	Vendors	Laing Packing and Prov. Co., Mill St., Montreal.	25125	Dr. J. T. Donald; above guarantee in ammonia, but below guarantee in phosphoric acid.
.....	.....	.....				
.....	11·24	28 95				
0·32	9·56	31 51	Vendors	Montreal Stock Yards Co., Mill St., Montreal.	25126	Dr. J. T. Donald; not registered.
2·44	13·43	22 13	Standard Chem. Co., Smith's Falls, Ont.	Brodie & Harvie, Bleury St., Montreal.	25127	Dr. J. T. Donald; above guarantee.
2 00	.....	.....				
2 08	8·50	19 67				
3·12	14 52	22 87	W. A. Freeman & Co., Hamilton, Ont.	Wm. Ewing & Co., McGill St., Montreal.	25128	Dr. J. T. Donald; above guarantee in ammonia and phosphoric acid; below guarantee in potash.
6·00	.....	.....				
6·95	9 70	25 45				
2·47	17 21	23 27	" "	" "	25129	Dr. J. T. Donald; above guarantee in phosphoric acid; below guarantee in ammonia and potash.
6·00	.....	.....				
7 61	8 80	32 76				

TABLE II.—Results of the Examination of 96

Date of Collection.	Name of Sample or Brand.	No. of Sample.	Result of Analysis. Nitrogen. Total in all States.	Nitrogen. Total stated as Ammonia.	Phosphoric Acid. Soluble in Water.	Phosphoric Acid. Citric Soluble.	Phosphoric Acid. Insoluble.	Phosphoric Acid. Total.	Phosphoric Acid. Available.
1904.	*Montreal District*—Con.		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
April 7	Potato Manure as sold	25130	2·59	3·14	5·79	3·91	4·26	13·96	9·70
	As guaranteed			3·00				8·00	
	Standard sample (1554)		2·64	3·21	6·23	2·08	5·28	13·59	8·31
" 7	Sure Growth as sold	25131	3·01	3·65	5·17	4·36	3.51	13·04	9·53
	As guaranteed			3·50				8·00	
	Standard sample (1550)		2·94	3·57	5·75	3·53	6·39	15·67	9·28
May 11	Special Fertilizer as sold	25136	3·11	3·88	8·04	0·15	3·08	11·27	8·19
	As guaranteed			3·50				10·00	8·00
	Standard sample (1535)		3·15	3·82	7·35	0·78	2·75	10·88	8·13
" 10	Corn Phosphate as sold	25137	1·40	1·70	6·43	1·88	1·14	9·45	8·31
" 10	Vermont Phosphate as sold	25138	1·96	2·38	6·93	1·65	1·68	9·66	7·98
" 10	Victor Fertilizer as sold	25139	0·98	1·19	4·78	0·96	4·43	10·17	5·74
	As guaranteed			2·00					7·00
	Standard sample (1508)		1·96	2·38	4·15	2·89	2·36	9·40	7·04
April 20	Fertilizer No. 1, as sold	25132	1·85	2·25	7·64	0·99	3·43	12·06	8·63
	As guaranteed			2·00				11·00	9·00
	Standard sample (1538)		1·78	2·16	6·40	1·08	4·48	11·96	7·48
" 20	Star Fertilizer, as sold	25133	1·85	2·25	3·91	0·22	4·73	8·86	
	As guaranteed			2·00				6·00	5·00
	Standard sample (1537)		1·82	2·21	4·15	0·58	1·67	6·40	4·73
" 20	Superphosphate of Lime, as sold	25134	0·21	0·25	8·26	2·20	4·04	14·50	
	As guaranteed							16·00	14·00
	Standard sample (1534)		0·14	0·17	10·04	1·99	4·60	16·63	12·03
" 20	Bradley's Eclipse, as sold	25135	1·40	1·70	6·41	2·12	2·06	10·59	8·53
	As guaranteed		1·03	1·25	6·00	2·00	2·00	10·00	8·00
	Standard sample (1517)		1·26	1·53	6·52	2·57	2·55	11·64	9·09
	Kingston District.								
" 26	"Victor," as sold	25140	1·74	2·12	3·81	1·27	4·72	9·80	5·08
	As guaranteed			2·00					7·00
	Standard sample (1508)		1·96	2·38	4·15	2·89	2·36	9·40	7·04
" 26	Corn Special, as sold	25141	1·95	2·37	4·46	1·23	4·34	10·03	5·69
" 26	No. 1 Fertilizer, as sold	25142	1·19	1·45	7·41	1·91	4·08	13·40	9·32
	As guaranteed			2·00				11·00	9·00
	Standard sample (1538)		1·78	2·16	6·40	1·08	4·48	11·96	7·48
" 26	Royal Canadian, as sold	25143	2·76	3·36	6·26	2·25	4·26	12·77	8·53
	As guaranteed			4·00					9·00
	Standard sample (1507)		2·80	3·40	7·16	1·48	3·96	12·60	8·64
" 26	Corn Special, as sold	25144	2·03	2·47	3·16	1·39	4·34	8·89	4·55
April 28	New Method, as sold	25145	1·17	1·42	5·65	1·50	2·81	9·96	7·15
	As guaranteed		1·03	1·25	6·00	2·00	2·00	10·00	8·00
	Standard sample (1520)		1·08	1·31	7·84	2·24	2·39	12·47	10·08
" 28	B. D. Seafowl Guano, as sold	25146	1·52	1·85	4·29	4·88	3·07	12·24	9·17
	As guaranteed		2·06	2·50	6·00	2·00	1·00	9·00	8·00
	Standard sample (1573)		2·10	2·55	6.85	1·01	3·33	11·19	7·86
" 28	Lawn Fertilizer, as sold	25147	1·36	1·66	8·36	1·45	2·27	12·08	9·81

SESSIONAL PAPER No. 14

Samples of Fertilizers as sold in 1904—*Continued.*

Potash.	Moisture.	Relative value per ton of 2,000 lbs	Manufacturer or Furnisher as given by Vendor.	Name and Address of Vendor.	No. of Sample.	Name and Observations of Analyst.
p. c.	p. c.	$ cts.				
3·42	17·69	22 83	W. A. Freeman & Co., Hamilton, Ont.	Wm. Ewing & Co., McGill St., Montreal.	25130	Dr. J. T. Donald; according to guarantee.
5·00	.....	.....				
5·79	10·20	24 26				
2·19	15·92	22 15	" "	" "	25131	Dr. J. T. Donald; according to guaranteed value.
3·00	.....	.....				
3·07	11·75	23 55				
6·86	11·38	26 60	Standard Chemical Fertilizer Co., Smith's Falls, Ont.	Brodie & Harvey, Bleury St., Montreal.	25136	Dr. J. T. Donald; as guaranteed.
6·00	.....	.....				
7·00	8·55	26 03				
2·27	20·09	16 13	Bowker Fertilizer Co.	J. McCause, Hemmingford, Que.	25137	Dr. J. T. Donald; not registered.
4·08	14·61	19 33	" "	" "	25138	" "
3·77	17·04	14 59	Nichols Chemical Co.	Keddy & Kenny, Hemmingford, Que.	25139	Dr. J. T. Donald; deficient in available phosphoric acid.
3·00	.....	.....				
4·49	9·75	18 65				
1·59	16·04	17 73	Standard Chemical Fertilizer Co'y., Smith Falls, Ont.	Greeley Bros. & Thompson, Sutton, P.Q.	25132	Dr. J. T. Donald; above guarantee.
1·25	.....	.....				
1·64	9·40	16 54				
1·80	8·17	13 02	" " "	" " "	25133	Dr. J. T. Donald; according to guarantee.
2·00	.....	.....				
1·64	3·85	12 56				
0·29	12·17	14 38	" "	" "	25134	Dr. J. T. Donald; below guarantee.
.....	.....	.....				
.....	10·75	15 96				
2·29	16·23	16 56	Am. Agricultural Chemical Co. (Bradley).	J. W. Murphy, Sutton, P.Q.	25135	Dr. J. T. Donald; according to guarantee.
2·00	.....	.....				
2·27	10·65	17 05				
3·18	13·73	15 22	Nichols Chemical Co., Capelton, P.Q.	N. Willard & Co., Prescott, Ont.	25140	Dr. W. H. Ellis; unadulterated.
3·00	.....	.....				
4·49	9·75	18 65				
3·80	13·77	17 06	" " "	" " "	25141	Dr. W. H. Ellis; not registered.
1·47	13·70	16 84	Standard Chemical and Fertilizer Co.	Arthur Templeton, Oxford Mill, Ont.	25142	Dr. W. H. Ellis; unadulterated.
1·25	.....	.....				
1·64	9·40	16 54				
3·88	11·35	22 49	Nichols Chemical Co.	" "	25143	Dr. W. H. Ellis; unadulterated.
5·00	.....	.....				
6·68	9·40	25 68				
2·50	13·74	14 50	" " "	H. Brown & Son, Brockville, Ont.	25144	Dr. W. H. Ellis; not registered.
2·16	9·70	14 58	American Agricultural Chemical Co. from stock of fall, 1903.	H. Brown & Sons, Brockville, Ont.	25145	Dr. W. H. Ellis. Unadulterated.
2·00	.....	.....				
4·51	9·52	20 10				
1·34	1·10	16 78	" " "	" " "	25146	" "
1·50	.....	.....				
1·52	9·80	17 37				
2·47	17·90	18 42	W. A. Freeman Co., Hamilton.	Hay, Flour and Seed Co., Brockville.	25147	" not registered.

TABLE II.—Results of the Examination of 96

Date of Collection.	Name of Sample or Brand.	No. of Sample.	Result of Analysis. Nitrogen. Total in all states.	Nitrogen. Total stated as Ammonia.	Nitrogen. Soluble in Water.	Phosphoric Acid. Citric Soluble.	Phosphoric Acid. Insoluble.	Phosphoric Acid. Total.	Phosphoric Acid. Available.
1904.	*Toronto District.*		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
April 13	Complete manure, as sold..	25148	3·64	4·42	4·82	4·32	2·39	11·53	9·14
	As guaranteed								
	Standard sample (1519)								
" 13	Potato Fertilizer, as sold..	25149	3·01	3·66	5·81	2·51	1·85	10·17	8·32
	As guaranteed..		2·06	2·50	5·00	3·00	2·00	10·00	8·00
	Standard sample (1519)..		2·10	2·55	6·20	2·89	2·23	11·32	9·09
" 13	B. D. Seafowl Guano, as sold.	25150	2·25	2·73	5·74	2·90	2·15	10·79	8·64
	As guaranteed		2·06	2·50	6·00	2·00	1·00	9·00	8·00
	Standard sample (1573)..		2·10	2·55	6·85	1·01	3·33	11·19	7·86
" 13	Sure Growth, as Manure sold.	25151	2·76	3·36	5·36	3·04	5·76	14·16	8·40
	As guaranteed			3·50				8·00	
	Standard sample (1550)..		2·94	3·57	5·75	3·53	6·39	15·67	9·28
" 13	Potato Manure, as sold....	25152	2·39	2·91	5·75	3·11	5·67	14·53	8·86
	As guaranteed			3·00				8·00	
	Standard sample (1554)..		2·64	3·21	6·23	2·08	5·28	13·59	8·31
" 14	Seafowl Guano, as sold....	25153	2·39	2·91	5·50	2·85	1·89	10·24	8·35
	As guaranteed..		2·06	2·50	6·00	2·00	1·00	9·00	8·00
	Standard sample (1573)		2·10	2·55	6·85	1·01	3·33	11·19	7·86
" 14	Complete Manure, as sold.	25154	2·92	3·55	5·25	1·56	2·84	9·65	6·81
	As guaranteed		3·29	4·00	6·00	2·00	1·00	9·00	8·00
	Standard sample (1574)..		3·36	4·08	6·09	2·74	3·00	11·83	8·83
" 14	New Method Fertilizer, as sold.	25155	2·07	2·52	5·79	2·77	1·90	10·46	8·56
	As guaranteed		0·82	1·00	6·00	2·00	1·00	9·00	8·00
	Standard sample (1572)..		0·91	1·10	6·85	0·69	3·65	11·19	7·54
" 15	Celery and Vegetable Manure, as sold.	25156	2·85	3·47	6·00	2·98	4·36	13·34	8·98
	As guaranteed			6·00				9·00	
	Standard sample (1552)..		5·29	6·42	4·99	3·52	3·83	12·34	8·51
" 15	Tankage, A Brand, as sold.	25157	11·47	13·92	0·18	2·44	0·98	3·60	2·62
	As guaranteed		9·13	11·08				5·86	
	Standard sample (1501)..		9·60	11·66		4·64	1·43	6·07	4·64
" 15	Bone Meal, as sold	25158	3·23	3·93		15·98	9·66	25·64	15·98
	As guaranteed			3·00				23·00	
	Standard sample (1557)..		2·43	4·16		15·51	9·75	25·26	15·51
" 15	Potato Manure, as sold ..	25159	2·85	3·47	5·60	3·04	5·91	14·55	8·64
	As guaranteed			3·00				8·00	
	Standard sample (1554)..		2·64	3·21	6·23	2·08	5·28	13·59	8·31
	London District.								
" 5	Fertilizer	22207	4·12	5·00	4·15	2·73	4·03	10·91	
" 5	Agricultural Fertilizer	22208	3·40	4·13	4·02	3·12	4·10	11·24	
" 6	Thomas Phosphate, as sold.	22210				14·20	3·70	17·90	
	As guaranteed							18·00	
	Standard sample (1583)..					16·64	2·87	19·51	16·64
" 6	Bradley Fertilizer, as sold.	22215	3·08	3·74		14·73	7·01	21·74	

SESSIONAL PAPER No. 14

Samples of Fertilizers as sold in 1904—*Continued.*

Potash.	Moisture.	Relative value per ton of 2,000 lbs.	Manufacturer or Furnisher as given by Vendor.	Name and Address of Vendor.	No. of Sample.	Name and Observations of Analyst.
p. c.	p. c.	$ cts.				
7·58	11·22	28·66	American Agricultural Company.	Tetterington Bros., St. Catherines, Ont.	25148	Dr. W. H. Ellis; not registered
2·92	13·35	21·16	" "	" "	25149	" unadulterated.
3·00						
2·95	13·85	19·82				
1·95	12·80	18·60	"	"	25150	" "
1·50						
1·52	9·80	17·37				
2·67	17·45	21·46	W. A. Freeman Co., Hamilton, Ont.	R. R. Gage, G. T. R. Depot, St. Catherines, Ont.	25151	"
3·00						
3·07	11·75	23·55				
2·80	16·06	21·17	" "	" "	25152	" below guarantee in potash.
5·60						
5·79	10·20	24·26				
1·86	13·42	18·45	Bradley Fertilizer Co	R. Cooper, Welland, Ont.	25153	" unadulterated.
1·50						
1·52	9·80	17·37				
6·66	6·82	23·44	" "	" "	25154	" "
7·00						
7·33	8·75	27·72				
6·27	10·86	22·82	" "	" "	25155	" "
2·00						
3·34	11·30	15·92				
4·35	16·91	23·74	W. A. Freeman Co., Hamilton, Ont.	M. Taylor, Barrie, Ont.	25156	Dr. W. H. Ellis, adulterated being under guarantee in ammonia and potash.
6·00						
7·64	8·80	32·76				
0·00	6·13	30·70	Harris Abbatoir Co.,	W. Rennie, Jarvis St., Toronto.	25157	Dr. W. H. Ellis, unadulterated.
	5·84	28·56				
5·20		28·21	W. A. Freeman Co., Hamilton, Ont	J. A. Simmers, King St., East Toronto.	25158	" "
	5·96	28·56				
3·13	16·32	22·52	" "	" "	25159	" "
5·00						
5·79	10·20	24·25				
6·66	6·53	26·88	" "	George J. Thorp, Seed Merchant, Guelph.	22207	Prof. E. B. Kenrick, insufficiently described.
1·90	7·40	20·31	V. Evans & Co., Seed Merchant, Hamilton.	"	22208	" "
	0·44	18·21	Canadian Agt., J. Thomas, Phosphate	Isiah Holman, Miller, Berlin.	22210	Prof. E. B. Kenrick, genuine.
		20·30				
	5·63	25·67	Bradley Co., Rochester and Boston.	W. R. Marshall, Seed Merchant, Stratford.	22215	" insufficiently described.

TABLE II.—Results of the Examination of 96

Date of collection.	Name of Sample or Brand.	No. of Sample.	Result of Analysis. Nitrogen. Total in all States.	Nitrogen. Total stated as Ammonia.	Phosphoric Acid. Soluble in Water.	Phosphoric Acid. Citric Soluble.	Phosphoric Acid. Insoluble.	Phosphoric Acid. Total.	Phosphoric Acid. Available.
1904.	*District of London*—Cod.		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
" 8	Bone Meal, as sold	22218	1·54	1·87	.....	16·83	10·72	27·55	.....
	As guaranteed	.....	.....	1·50	.....	.....	.....	25·00	.....
	Standard sample (1596)	.....	1·40	1·70	.....	7·36	15·03	22·39	7·36
" 8	Ground Bone Fertilizer	22220	1·38	1·68	.....	17·33	12·02	29·35	.....
	As guaranteed	.....	.....	1·50	.....	.....	.....	25·00	.....
	Standard sample (1596)	.....	1·40	1·70	.....	7·36	15·03	22·39	7·36
" 11	Blood Meal Fertilizer	22225	11·84	14·38	.....	.....	.....	.....	.....
April 12	Potato Fertilizer	22228	2·11	2·56	4·95	3·33	2·42	10·70	.....
	As guaranteed	.....	.....	2·50	5·00	3·00	2·00	10·00	.....
	Standard sample (1519)	.....	2·10	2·55	6·20	2·89	2·23	11·32	9·09
" 12	Ingersoll Fertilizer, as sold	22229	6·76	8·21	.....	12·07	4·21	16·28	.....
	As guaranteed	.....	.....	9·00	.....	5·50	6·80	12·30	.....
	Standard sample (1549)	.....	7·00	8·50	Trace.	9·31	0·60	9·91	9·31
" 12	Fertilizer	22230	5·09	6·18	.....	4·53	2·40	6·93	.....
	British Columbia District.								
" 15	Fertilizer A, as sold	24937	3·99	4·70	9·80	0·10	0·10	10·00	.....
	As guaranteed	.....	4·00	4·86	.....	.....	.....	10·00	.....
	Standard sample (1585)	.....	3·78	4·59	11·51	1·15	Trace.	12·66	12·66
" 13	Fertilizer B, as sold	24938	2·92	3·55	9·20	0·30	0·10	9·60	.....
	As guaranteed	.....	3·50	4·25	.....	.....	.....	9·00	.....
	Standard sample (1586)	.....	3·57	4·33	10·74	0·77	Trace.	11·51	11·51
" 13	Fertilizer C, as sold	24939	0·58	0·71	12·40	0·50	0·10	13·00	.....
	As guaranteed	.....	.....	.....	.....	.....	.....	12·50	.....
	Standard sample (1587)	.....	Trace.	.....	13·30	1·60	Trace.	14·90	14·90
" 13	Superphosphate, as sold	24340	0·70	0·84	15·50	6·00	0·10	15·60	.....
	As guaranteed	.....	.....	.....	.....	.....	.....	16·00	.....
	Standard sample (1588)	.....	.....	.....	17·59	0·19	Trace.	17·78	17·78
" 13	Sulphate of Potash	24941	.....	.....	.....	.....	.....	.....	.....
	As guaranteed	.....	.....	.....	.....	.....	.....	.....	.....
	Standard sample (1591)	.....	.....	.....	.....	.....	.....	.....	.....
" 20	Muriate of Potash, as sold	24942	.....	.....	.....	.....	.....	.....	.....
	As guaranteed	.....	.....	.....	.....	.....	.....	.....	.....
	Standard sample (1592)	.....	.....	.....	.....	.....	.....	.....	.....
" 20	Nitrate of Soda, as sold	24954	15·50	18·80	.....	.....	.....	.....	.....
	As guaranteed	.....	16·00	19·43	.....	.....	.....	.....	.....
	Standard sample (1589)	.....	15·26	18·52	.....	.....	.....	.....	.....
" 20	Nitrate of Soda, as sold	24943	15·90	19·30	.....	.....	.....	.....	.....

Samples of Fertilizers as sold in 1904—*Concluded.*

Potash.	Moisture.	Relative value per ton of 2,000 lbs.	Manufacturer or furnisher as given by vendor.	Name and Address of Vendor.	No. of sample.	Name and Observations of Analyst.
p. c.	p. c.					
	3·57	25 41	Michigan Carbon Works, Detroit.	Darch & Hunter, Seed Merchants, London.	22218	Prof. E. B. Kenrick, genuine.
	3·15	15 95				
	3·91	25 97	Michigan Carbon Co., Detroit.	Percome & Donaldson, Seed Merchants, Strathroy.	22220	" "
	3·15	15 95				
	7 45	28 42	W. A. Freeman, Hamilton, Blood Meal Fertilizer.	Patrick Brothers, Seed, Flower and Feed Merchants, Woodstock.	22225	Prof. E. B. Kenrick; insufficiently described.
3·17	11·42	19 12	Bradley Fertilizer Co., Buffalo and New York.	Robertson & McKay, Hardware Merchants, Ingersoll.	22228	Prof. E. B. Kenrick; genuine.
3 00						
2·95	13 85	19 82				
	6·65	30 75	Ingersoll Packing Co., Ingersoll.	Ingersoll Packing Co., Ingersoll.	22229	" "
	12·50	27 22				
	3·94	18·93	London Soap Co., London.	London Soap Co., London.	22230	Prof. E. B. Kenrick; insufficiently described.
8·80	17·20	31 51	Victoria Chemical Co., Victoria.	Victoria Chemical Co., Victoria.	24937	Dr. C. J. Fagan; genuine.
7·00						
7 04	11·80	32 28				
12 80	14 00	32 43	" "	" "	24938	" "
11·00						
10 75	12·00	34 28				
12·70	13·70	30 29	" "	" "	24939	" "
11·00						
10·75	11·95	29 00				
	17·70	20 45	" "	" "	24940	" "
	11·20	21 30				
50·00		52 50	Bogardus & Co., Seattle, U.S.	M. J. Henry, Vancouver.	24941	"
50·00						
47·16	2 30	49 51				
50·80		53·34	" "	" "	24942	" "
50 00						
46·64	5·45	49 30				
	2·10	40 30	Victoria Chemical Co., Victoria, B.C.	J. Brown & Sons, Vancouver.	24954	"
	3·00	39 67				
	1·50	40 34	Bogardus & Co., Seattle, U.S.	M. J. Henry, Vancouver, B.C.	24943	"

MEMORANDA ON MANURES.

Since this publication is intended for circulation among our farmers, it has been thought advisable to take advantage of its issue by reprinting some of the notes which have appeared in former bulletins, and adding a few additional particulars from works which have recently appeared, regarding the application of natural manures and artificial fertilizers.

It is about fifty years since Stoeckhardt, at that time professor in the agricultural school of Tharandt, Saxony, said that a farmer who bought guano, bonemeal, or other artificial fertilizers, and at the same time neglected to make proper use of the dung of the cattle on his own farm, must be regarded as an agricultural spendthrift. Every intelligent farmer in Canada will in these modern days agree with the old German professor, and maintain that the treasury of the farm is the dungstead, and that leaks and emanations from it of valuable fertilizing constituents must lead to financial embarrassment and possibly ruin.

This statement may be positively made without in the slightest degree detracting from the merits of artificial fertilizers, for when properly selected and applied, their value becomes abundantly evident. The question as to whether their use is remunerative has been frequently discussed, and depends to a large extent on the care employed in their selection. Supposing that the intelligent farmer has considered composition, cost, &c., to the best of his ability, made his selection and applied the fertilizer, he may still be in doubt as regards the result unless he takes steps to make a manure trial with it. As regards the best way of doing this, Hellriegel, in a publication, dated 1897, has related his experience. He recognizes how difficult it is for practical agriculturists, fully occupied with their regular work, and engaged in meeting all the difficulties caused by workmen, weather and market rates, to carry out regularly planned manure experiments. He therefore describes a method, which experience in his estimation had justified, and recommends it for the purpose of ascertaining whether any application of lime, marl, dung or fertilizers had really produced the improvement which from the point of view of cost had been expected. This plan is to pass over, at one or several places, properly selected, a few square rods of the field without applying the dung or fertilizer. In this way unmanured plots, which do not require to be measured with great exactitude, but merely paced, and do not need to be harvested separately, are left in the manured field, by means of which any improvement in the latter may be remarked and valued.

This plan exacts that it should be possible to *see* a distinct difference between the unmanured plots and the manured field, not only as regards the height and density of the resulting crop, but also in reference to the fullness of the ears and the development of the grains. In the event of such a distinct difference being invisible the manure is justly discredited as unfit for its intended purpose. It would seem advisable to recommend this plan to farmers who use fertilizers, because some of them may manure the whole field, fail to see any improvement on account of being unable to make comparisons, and perhaps condemn the fertilizer unjustly. The simplicity of the plan above described, and its applicability everywhere and every year would appear to commend it to the practical agriculturist. At the same time it is necessary to remark that there are instances on record of fertilizers having been applied and remaining utterly without effect owing to some defect in the soil. Such defects have often been cured by a previous application of marl or lime, which not only produced good effects themselves, but improved also the action of the fertilizers afterwards applied.

THE CARE OF NITROGEN.

This element is the most valuable of fertilizing constituents, and one which is exceedingly liable to loss.

In many of the fertilizers described in this and former reports their cost is very much increased by the admixture of nitrogenous constituents. This cost farmers might save by properly caring for the stock of nitrogen on their farms, and this stock might even be increased by cultivating those crops which have the power of appropriating the nitrogen of the atmosphere. Nevertheless the fertilizer manufacturers still seem to be under the necessity of supplying this element in considerable quantity in their goods, and of charging for it. In the case of the mixed fertilizers, this extra charge varies from $8 to $14 per ton, which the farmer must pay if he purchases, and which he can readily save in his own stables or produce upon his own farm.

Among the standard samples described in the present report for 1904 there are some whose guarantee in ammonia is placed at 1·50 p.c. and even at 1·00. Less than 1·50 p.c. of this ingredient is too small a quantity where its application is required, and where not needed it is useless to apply it. It is, as a rule, cheaper to purchase fertilizers containing large percentages of the fertilizing ingredients and apply a lesser quantity per acre.

Nearly the whole of the nitrogen in the fodder fed to farm stock is to be found in the excreta of the animals, and one-half of it is contained in the urine. It is further well known that 95 per cent of the potash contained in the food of cattle and sheep may be recovered by carefully saving the liquid manure only. It has, however, been ascertained that stable-yard manure experiences considerable loss of its fertilizing constituents, but more especially of nitrogen, when left to itself in the dung heap. According to the experiments of Wolff, this loss amounts to 55 per cent of the nitrogen contained in fresh manure from horned cattle. The later experiments of Heiden and Holdefleiss place it at 23·4 per cent. These results were obtained when ordinary reasonable care is taken of the manure, but give no data for estimating the loss which occurs when, as is very frequently the case in Canada, the manure is treated with the grossest neglect. It is safe to assume that, generally, 50 per cent of the nitrogen contained in the barn-yard manure of this country returns unutilized to the atmosphere, or is otherwise lost by careless treatment. Supposing that an average quantity of 36,000 pounds is produced in fresh condition annually by each animal, and that it contains 0·4 per cent of nitrogen it follows that a loss of 72 pounds of nitrogen, worth $8.64, takes place for each head of cattle. This loss can be prevented by daily strewing the stables with two pounds of ground plaster for each animal, which at once prevents any smell of ammonia from arising in the stable. The quantity prescribed means 700 lbs. or a cost of about $2.50 annually for each 1,000 lbs live weight, but by adopting this plan, the farmer would to a great extent be relieved from the necessity of purchasing the nitrogen of artificial fertilizers.

In a pamphlet published by Vieweg, 1859, entitled *Ein Pfund Stickstoff kaum einen Groschen*, which may be freely translated 'A pound of nitrogen for a penny,' Dr. Meyer-Altenberg maintained that ground gypsum is the very best preservative of barn-yard manure when applied in the stable, because it secures 'certainty and completeness of effect, ease of execution, and the lowest possible cost.' He further described the effect of its application on the domain of Beberbeck in Hesse, and other impoverished farms, showing that it is possible to bring such into a fertile condition without the purchase of manure or fertilizers or feeding stuffs, excepting a little straw for bedding and oats for the horses.

TREATMENT OF STABLE-YARD MANURE.

Dr. Meyer-Altenberg, in the little work above mentioned, takes care to point out, that the use of gypsum, without subsequent careful treatment of the dungheaps, does

not give the desired effect, and he dwells on the importance of having the manure thoroughly trodden down, and made as compact as possible. This is also shown in Dr. J. Koenig's prize essay, 'How can the farmer preserve and increase the stock of nitrogen on his property?' (Berlin, 1887.) In a special chapter of this work the author discusses 'The evolution of free nitrogen during the fermentation and storage of stable manure, describes the experiments which were made from 1860 to 1885 regarding its treatment, and gives, finally, the results of the discussion from which the following sentences may be translated with advantage :—

1. In the decomposition of nitrogenous substances of every nature a loss, more or less considerable, of free nitrogen takes place.

2. This loss is the greater the more the atmosphere has access to the decomposing mass.

3. Too much moisture is just as hurtful as too little. Stable manure requires such a degree of humidity as permits its components to lie close to each other.

4. The addition of substances which fix ammonia (such as gypsum, kainite and kieserite) prevent or reduce the loss of nitrogen. *These substances are, however, of little or no value if care is not taken at the same time to prevent as much as possible the access of air.*

12. In storing stable manure in dungsteads the latter must be watertight and roofed in, and the treading down of their contents by the farm animals is to be recommended.

In a recent bulletin (No. 63) of the Pennsylvania State College Agricultural Experiment station (1903) some important experiments on steer-feeding are described which confirm some of the foregoing results. The following quotations are of interest :—'The trampled manure suffered little loss of fertilizing constituents, though less than two-fifths of the dry matter of food and litter was recovered in the manure.' 'The untrampled manure suffered more extensive losses of organic matter and nitrogen than the trampled manure, owing chiefly to the more complete exclusion of air in the latter case.'

One thing in connection with this question is perfectly certain and that is that the use of gypsum, or ordinary ground land plaster, prevents any loss of nitrogen in the stable, and while the manure is being forwarded to the dungheap. Further if the work from which the foregoing quotations have been made be carefully studied, and also the experiments and writings of Holdefleiss, Vogel and others, it appears to be quite certain that the use of the same article, or the gypsum produced in the manufacture of 'acid-phosphate,' completely prevents the loss of ammonia from the liquid part of the manure, and also from the organic nitrogen of the solids, provided the whole has, previous to fermentation, been made thoroughly compact, and atmospheric air almost completely excluded. Where it is found impossible to attend to the latter precautions, the safest way will probably be found to lie in avoiding fermentation altogether, by conveying the fresh manure, after treatment with gypsum, on the field to be manured and bringing it under the soil as rapidly as possible. The latter practice has been proved to be most advantageous by the experiments which have been carried on for some time past, at the Central Experimental Farm by Director Saunders. (See Reports for 1898.)

Not only has the addition of substances which have the faculty of fixing ammonia been recommended for stable manure, but its improvement to a greater extent has been proposed by the addition of fertilizers. The following quotation is taken from Bulletin No. 45 (for March, 1897) of the Massachusetts Agricultural College, and was written by Dr. C. A. Goessmann, Chemist for that institution :—

'*The practice of adding to the manurial refuse materials of the farm as stable manure, vegetable compost, &c., such single commercial manurial substances as will enrich them in the direction desirable for any particular crop to be raised, does not yet receive that degree of general attention which it deserves.*' (The italics are in the original.) 'An addition of potash in the form of muriate or sulphate of potash, or of phosphoric acid in the form of fine ground South Carolina or Florida soft phosphate, &c., will in many

instances not only improve their general fitness as complete manure, but quite frequently permit a material reduction in the amount of barn-yard manure ordinarily considered sufficient to secure satisfactory results.'

'Average composition of seventy-five samples of barn-yard manure:—

	Per cent.	Lbs. per ton.
Moisture	67·00	1,340·0
Nitrogen	0·52	10·4
Potassium oxide	0·56	11·2
Phosphoric acid	0·39	7·8

'The average barn-yard manure contains, it will be noticed from the above statement, a larger percentage of nitrogen, as compared with its potash and phosphoric acid than is generally considered economical. An addition of from thirty to forty pounds of muriate of potash, and of one hundred pounds of fine ground natural phosphate (soft Florida or South Carolina floats) per ton of barn-yard manure would greatly increase its value as an efficient and economical general fertilizer.'

These are no doubt most excellent suggestions, and there is no reason why these substances should not be introduced into the stable manure in the same manner as in the case of the ground plaster above mentioned. Plain superphosphate and kainite might also be used, some of the constituents of which would be useful in fixing the ammonia, as soon as formed from the organic nitrogen. Should this suggestion be found to have practical value, there is no doubt that our fertilizer manufacturers would be found able to supply our farmers, at a moderate cost, with a mixture of ground plaster, superphosphate and kainite, in such proportions as experience might show to be most advantageous. No better application can be made of the wood ashes produced in the farmer's household than by mixing them with the barn-yard manure, and most excellent results are known to have followed this practice.

ACQUISITION OF NITROGEN.

Not only can the farmer save almost the whole of the nitrogen contained in the fodder fed to his cattle, but he can actually increase the stock of it stored away in his fields, agricultural products and manure heaps, by a judicious course of crop rotation. For more than a century agricultural chemists have discussed the question as to whether free, atmospheric nitrogen can be assimilated by plants, but it may now be regarded as perfectly settled in the affirmative, if regard is had only to the plants of the order leguminosae, such as beans, pease, lentils, vetches, clovers, alfalfa, serradella, &c. Even the great English agriculturists, Sir J. B. Lawes and Sir Henry Gilbert, who had previously been of an opposite opinion, have now admitted that this appropriation of nitrogen has been completely proved. This acknowledgment was made by Sir Henry Gilbert, at a great meeting of agricultural chemists held at Halle, in Germany, in September, 1891. Thus, modern research has confirmed not only modern agricultural practice, but also the experience of antiquity, for Prof. W. Strecker has pointed out a passage in Pliny which says: 'Lupines require so little manure that they, in fact, replace it; vetches make the land more fertile. Corn should be sown where previously lupines or vetches have stood, because they enrich the land.'

It is not, however, to be supposed that this utilization of atmospheric nitrogen by leguminous plants can take place upon very poor soils or upon those destitute of the inorganic constituents which they require. The latter must in such cases be supplied in the shape of potash with some phosphoric acid, as was done with great success by Schultz, of Lupitz, a practical agriculturist in North Germany. In fact, had it not been for his investigations, the controversy above referred to might have continued without results up to the present hour.

Professor Kœnig, of Muenster, gives the following summary of Schultz's experience:—

'Schultz acquired the farm Lupitz in the year 1855: its soil consisted of a poor, cold diluvial sand: the profit in working it was very small. Lupines yielded, indeed,

as a fodder tolerable results, but when used as green manuring for rye and oats, no return was obtained from them. The application of artificial manures produced good crops, but they did not pay; burnt lime showed itself to be too heating. The use of manure was more favourable, especially when fertilizers containing phosphoric acid were used at the same time. But at the best the total result was not satisfactory.

'Shortly after Schultz acquired Lupitz, the great discovery of potash salts was made, and about 1860 they began to be produced from the mines of Stassfurth. Schultz made up his mind to try them as manure and he obtained the most surprising results. After lupines had shown themselves to be useless as forerunners of grain, they were excluded from the rotation and grown on a separate field without any manuring and alternating with sheep pasture. But the harvest on these became worse and worse until the field in question became quite lupine "sick." Schultz made his first trial on this field, manuring it with 300 pounds kainite per morgen (1 Prussian morgen = 0·631 acre); the sickness was at once cured, and for twenty-five years afterwards Schultz grew lupines on this ground without interruption, always with the application of 300 pounds kainite. Schultz obtained similar good results on the ground which had received the marl, by the application of potash salts. This ground had indeed yielded well with lupines for two years after the application of the marl, but in the third year they sickened here too. When, however, 300 pounds kainite were applied here and ploughed in, the ground was cured, although an application of phosphates had not produced the desired results.

'The favourable influence which the manuring with kainite or potash salts had exerted on lupines induced Schultz to try them on grain, in conjunction with phosphates. But in this case he obtained contradictory results, according to the nature of the crops which preceded the grain. For instance while grain sowed after lupines and manured with potash and phosphates yield very good and remunerative harvests, these were not to be obtained if grain was grown after grain or after potatoes. This behaviour of these crops was explained by Schultz in this way: that lupines or deep-rooted plants leave in the soil after harvest a residue of root, in which a considerable amount of nitrogen has accumulated, an amount sufficient to supply the wants of the following grain crops; that, on the other hand, the application of potash and phosphates, to grain, after a preceding grain crop, is without effect, for the reason that the latter has consumed the stock of nitrogen. Grain crops always reduce this stock; never increase it. Schultz has given the name of "nitrogen collectors" to the lupines and similar plants, while grains are called "nitrogen consumers." His system of rotation is therefore the following:—Sow first nitrogen collectors (lupines, pease, beans, vetches, clover, lucerne, serradella, &c.), or, as they have been called, renovating crops, and give them 300 pounds kainite per morgen, with perhaps an addition of 20 pounds phosphoric acid. After harvesting the nitrogen collectors, sow a nitrogen consumer, raising a grain or exhausting crop, giving it also 300 pounds kainite and 20 pounds phosphoric acid. The grain crop is perfectly successful, because the first crop left behind it nitrogen enough to supply the wants of the grain. In this way the keeping of stock, which is expensive on a poor sandy soil, can be reduced and the purchase of nitrogenous fertilizers dispensed with, because the nitrogen collectors are able to stock the soil with that valuable element.'

The foregoing description is taken from Professor König's 'Stickstoff Vorrath,' published in 1887 (Paul Parey, Berlin). It was in 1884, nearly thirty years after the purchase of his sandy farm, that Schultz, of Lupitz, published the results of his experience, although they did not contain anything very new and although they only confirmed experiences still older than his own. But his case was surprising and his explanation of the cause of his successful farming challenged the attention of scientific agriculturists. The consequence has been the issue of many pamphlets on the subject, and an activity in the region of agricultural experimenting which is not yet ended. Atwater, Wagner, Heiden, Hellriegel and many others have participated in these investigations, and Professor Wood, of the Storrs Agricultural School in Connecticut, has given the following general conclusions as the result of the work:—

1. 'Pease, alfalfa, serradella, lupine, clover in all probability, and apparently leguminous plants in general, are able to acquire large quantities of nitrogen from the air during their period of growth.

2. 'There is scarcely room to doubt that the free nitrogen of the air is thus acquired by plants.

3. 'That there is a connection between root tubercles and this acquisition of nitrogen is clearly demonstrated. What this connection is, what are the relations of micro-organisms to the root tubercles and the acquisition of nitrogen, and in general how the nitrogen is obtained are questions still to be solved.

4. 'The cereals with which the experiments have been completed have not manifested this power of acquiring nitrogen, nor do they have such tubercles as are found on the roots of legumes.

5. 'In the experiments here reported, the addition of soil infusions did not seem necessary for the production of root tubercles. A plausible supposition is that the micro-organisms or their spores were floating in the air and were deposited in the pots in which the plants grew.

6. 'As a rule the greater the abundance of root tubercles in these experiments, the larger and more vigorous were the plants and the greater was the gain of nitrogen from the air.

7. 'In a number of these experiments, as in similar ones previously reported, there was a loss of nitrogen instead of gain. The loss occurred where there were no root tubercules; it was especially large with oat plants, and largest where they had the most nitrogen at their disposal in the form of nitrates. As the gain of nitrogen by the legumes helps explain why they act as renovating crops, the loss in the case of the oats suggests a possible reason why they should appear to be an exhausting crop.

'Practical inferences:—The ability of legumes to gather nitrogen from the air helps to explain the usefulness of clover, alfalfa, pease, beans, vetches and cow pease as renovating crops, and enforces the importance of these crops to restore fertility to exhausted soils. The judicious use of mineral fertilizers (containing phosphoric acid, potash and lime) will enable the farmer to grow crops of legumes which, after being fed to his stock, will, with proper care to collect and preserve all manure, both liquid and solid, enable him to return a complete fertilizer in the shape of a barn-yard manure to his land. A further advantage of growing these crops is that the nitrogenous material, protein, which they contain in such great abundance, is especially valuable for fodder.'

From the foregoing it seems that, in the present condition of our knowledge, the conclusion may be drawn that the atmosphere stands ready to furnish the farmer, gratis, with all the organic constituents which his crops require, provided always that he, on his part, will exercise a sufficient amount of skill and intelligence in appropriating and retaining on his farm the fertilizing materials, and especially the nitrogen. If he does this, all that is necessary for him to provide, in order to replace the losses which his farm sustains from the sale of stock or produce, are the inorganic or mineral constituents of these, and especially the phosphoric acid and potash. There is much in all this to remind one of Sprengel and Liebigs teaching of fifty years ago, according to which a plant cannot thrive if its soil does not contain all the substances which are to be found in its ash.

UTILIZATION OF SEWAGE.

The losses in fertilizing material which are sustained, as above mentioned, on account of the neglect or unscientific treatment of barn-yard manure, are very trifling when compared with those which the community suffers in the almost total loss of the nitrogen, phosphoric acid and potash contained in human excreta. The utilization of such always becomes a subject for discussion when the question is raised as to how a cheaper class of manures than the artificial fertilizers can be obtained for use in agriculture.

Where the water carriage system of removing sewage and excrement has been introduced, nothing is to be hoped for in the recovery of their fertilizing constituents. Even in cases where, at large expense, establishments have been erected for the treatment of sewage by precipitation or similar methods, the products have been found to be

entirely destitute of agricultural value. The greater part of the fertilizing constituents of sewage are in such a soluble condition, and have been diluted with water to such an extent, as to render their recovery economically impossible. It has been attempted in the neighbourhood of many cities in England and on the continent of Europe to use the sewage for irrigation and as liquid manure, but this method of utilization has been found to be in the highest degree imperfect. At Berlin, it has been proved, that of the nitrogen contained in its sewage, at the very most only 13·8 per cent is found in the agricultural products of all the magnificent farms irrigated by it in the neighbourhood of the city. When the use of water for removing house refuse is excluded, and ordure and urine are removed as manure in their natural state, their utilization is possible, and is made a sourse of revenue in such towns as Stuttgart, Groningen, Greifswald, &c. But the systems of this class which are in use have all their disadvantages, as is proved by the tendency which municipal authorities constantly show to adopt the water carriage system. The greatest disadvantage under which these systems labour is the difficulty caused by the offensiveness to sight and smell of the material with which they have to deal. This has been entirely met by the use of moss litter as an absorbent, deodorizer, and disinfectant.

MOSS MANURE.

The first public mention of the usefulness of moss litter as a deodorizer and absorbent seems to have been made by Dr. Ludwig Happe, in Braunschweig, in December, 1880, since which time its application for the purpose has gradually increased until now, when the system has been introduced into several towns in Germany, and is also practised in Congleton, Cheshire, England. In Canada this method of deodorizing human refuse has been in use for years at Caledonia Springs. It, of course at once recalls the dry earth system regarding which great expectations were at one time entertained. The advantages of moss litter over dry earth for the purposes in question are, however, very decided. They consist in the perfect inoffensiveness of the moss litter product, in the fact that one part of moss litter will deodorize and dry at least six parts of mixed excreta, and in the greater agricultural value of the resulting manure. Dry earth (which is required in quantity at least equal to that of the excreta) is valueless from an agricultural point of view, but this is not the case with moss litter, which, as its analyses show, often contains as much nitrogen as ordinary barn-yard manure. Numerous analyses have been made of moss litter manure as produced in Germany, and its average contents from seven different towns may here be stated.

	p. cent.	lbs. per ton.		Value per ton.
Nitrogen	0·644	13·28	at 13c.	$1 72
Phosphoric acid	0·350	7·00	5	0 35
Potash	0·285	5·70	5¼	0 30
Water	83·00			$2 37

Numerous trials have been made on various crops with this manure, and very satisfactory results are always reported. In all cases it is stated to excel barn-yard manure even when the latter is used in much greater quantity.

In a paper read before the Royal Society of Canada, on May 27, 1902, Mr. T. Macfarlane describes a manner of applying the moss litter, by means of which the quantity used is much reduced, and the value of the resulting manure greatly increased.

Canada possesses in its bogs and swamps inexhaustible quantities of moss litter, which is frequently found in beds several feet in thickness lying above the peat. The

following tests have been made in the Inland Revenue Laboratory of moss litter from various localities in the Dominion :—

	Moisture.	Ash.	Nitrogen.
	Per cent.	Per cent.	Per cent.
Moss litter, Berwick, N.S.	14·40	1·16	1·26
Black muck, "	13·30	3·68	1·58
Moss from Great Village, N.S.	63·14	3·46	0·63
Sphagnum moss from Shippegan, N.B.	12·45	1·55	0·55
Light coloured moss litter from Lincoln Parish, N.B.	11·55	1·40	1·79
Dark coloured sample from the foregoing locality.	10·95	0·80	1·06
Moss litter from Musquash, N.B., upper layer	11·50	0·95	0·82
Moss litter from same locality, lower layer	12·50	0·90	0·72
Peat from St. Bridget, Province of Quebec	13·30	2·50	1·48
Peat from St. Hubert, Quebec	12·35	2·68	1·84
Light coloured moss litter from Caledonia Springs	10·00	1·60	2·95
Dark coloured moss litter from same locality	11·60	2·70	2·28
Peat from the same locality	10·05	3·90	2·94
Surface moss from the Mer Bleu at Eastman's	10·85	2·80	0·71
Surface moss from the Mer Bleu at Baldwin's Farm	7·90	2·66	1·47
Surface moss from the Mer Bleu at Baldwin's Farm, 18 inches deep	27·90	1·72	1·64
Peat from Mer Bleu at McFadden's Farm, wide ditch, Navan	22·60	4·40	2·21
Peat from Mer Bleu, McFadden's Farm, narrow ditch, Navan	9·40	6·62	2·80
Peat from near Stratford, Ont.	16·80	9·10	1·91
Hypnum moss from near Stratford, Ont.	8·75	9·72	2·04
Moss litter from bog in Welland County, Ont.	3·85	4·70	1·51
Peat lying underneath the foregoing	5·30	4·85	1·41
Peat from the same locality, lying 4½ feet below surface	3·25	41·25	1·52
Peat from Dodson's bog, near Beaverton, Ont	18·42	9·04	1·89

The manufacture of moss litter has been attempted at Musquash, in New Brunswick, and it has been produced in Welland county, Ontario. From the latter locality several bales of the moss litter were supplied for experimental purposes, and Dr. Laberge, of Montreal, undertook to superintend the carrying out of an experiment to determine its deodorizing and absorbent qualities. He reported that 100 lbs. of moss litter were sufficient for drying 800 lbs. of ordinary excreta from privy pits in Montreal, and rendering it entirely inoffensive. A sample of the product remained for days in his office without attracting notice and, indeed, it was quite devoid of odour. Its analysis gave the following results :—

	p.c.	Lbs. per ton.			Value per ton.
Nitrogen	1·31	26·2	at	13c.	$3 41
Phosphoric acid	0·90	18·0	"	5	0 90
Potash	0·14	2·8	"	5¼	0 15
Water	65·47				$4 46

The valuation of ordinary fresh barn-yard manure with 75 per cent of water is about $2 per ton : with 67 per cent water as in the case of the average given above by Dr. Goessmann, the value is nearly $2.25. Therefore, much better results might be expected agriculturally from a 'moss manure' of the composition just described.

Moss litter might also be applied with great advantage in public urinals. When a sample of it was supersaturated with urine and artificially dried, and this process repeated several times, no offensive odours were developed and the product was found on analysis to contain 12·41 per cent of nitrogen, which is equal to a valuation of $32.26 per ton.

These facts are reported in order to show that Canada possesses in her waste lands abundance of material which might be used in our towns and villages for the production of a very valuable manure, with the simultaneous introduction of very many sanitary advantages. It is not to be expected that cities or towns which are advantageously situated for the water carriage system, or which have already adopted it, will make any changes, but there are many towns and villages in the Dominion where the application of the moss litter system would be very suitable, and the authorities of which, by selling the product or giving it gratis to the farmers of the neighbourhood, might confer a great benefit on agriculture.

APPENDIX L.

BULLETIN No. 98—WHEATEN FLOUR.

OTTAWA, July 22, 1904.

W. J. GERALD, Esq.,
Deputy Minister of Inland Revenue.

SIR,—During the months of January and February last, samples of wheaten flour were obtained in all the collection districts of the Dominion as required in your letter of January 14, 1904. These are described in the statement, Table I appended to this report from which it will be seen that the number of samples collected in the various districts was as follows :—

Halifax	8
Prince Edward Island	2
New Brunswick	6
Quebec	13
Montreal	12
Kingston	7
Toronto	8
London	7
Winnipeg	4
Calgary	2
British Columbia	6
Total	75

The results of testing these samples are given in Table I which also contains all the information obtained by the food inspectors as regards the designations of the various brands, and the names of the manufacturers or furnishers. Many of the samples were simply sold as 'flour,' and it is quite possible that the manufacturers names as given by the vendors may not be accurate. Besides the descriptions of the 75 purchased samples there have also been introduced into the table the results of examining 7 standard samples of flour obtained from the Secretary of the Board of Trade, Montreal, as well as of 4 samples of their regular brands furnished by the Lake of the Woods Milling Co. These will be found useful for purposes of comparison, and perhaps afford a means of ascertaining whether any of the samples collected in the open market are of abnormal quality.

The characters possessed by the samples are detailed in the various columns of Table I and under the following numbers :—1. Total nitrogen ; 2. wheat proteids ; 3, 4 and 5. gluten ; 6, 7 and 8. degree of fineness as shown by bolting ; 9. acidity ; 10. Total ash ; 11, ratio of proteids to dry gluten. It will thus be seen that, besides being chemically examined, all the samples were subjected to some of the practical tests known to millers. Regarding the value of the results stated in Table I the following remarks may be made.

In no case of the purchased samples does the ash exceed 0·85 per cent, and the highest ash of the Montreal standard samples is 0·82 per cent. This demonstrates that there is no such thing practiced in Canada as the addition of inorganic substances to wheaten flour, and disproves most effectually the absurd rumour occasionally heard that very white and very finely ground gypsum is sometimes used for adulterating flour.

No indication has been found of the admixture in these samples of flour from any other or lower priced grain. Such an addition would in the case of maize flour be economically possible, but would result in lowering the quantity of gluten yielded by the sample. All those samples in which the percentage of dry gluten was less than 10 or in which the ratio of dry gluten to proteids was less than 1·2 to 1 have however been examined under the microscope without the discovery of any foreign starch. The number of samples so examined amounts to 37 and it was thought quite unnecessary to examine the others. It is therefore safe to conclude that no suspicion of adulteration by foreign grain attaches to any sample of Canadian flour.

The fineness of the various samples is indicated in columns 6, 7 and 8, which show the results of the bolting test. The quantity remaining on bolting cloths Nos. 10 and 12 indicates the coarser particles present which no doubt, when the flour is made into dough, require a somewhat longer time to take up the necessary quantity of water. It may here be mentioned that no attempt has been made to determine the degree of whiteness of the various samples. The differences are so extremely slight that Lovibonds Tintometer was found useless for the purpose. The finest product in bolting is usually a shade lighter in colour than that collected between No. 10 and 12 bolting cloths, but it was not considered of sufficient importance to attempt to record this in the case of each sample.

It is generally supposed that the value of wheaten flour for breadmaking purposes depends on the quantity and elasticity of the gluten which it contains. As regards quantity it would appear that flours are on sale in Canada which give widely different per centages on being subjected to the gluten test. The columns 3, 4 and 5 give the results yielded by this process, which consists in making up 25 grammes of flour with as much water as is necessary to make a ball of stiff dough. This is then allowed to rest half an hour in order that the flour particles may be completely permeated by the water. The ball is then kneaded by the fingers over a fine hair sieve and under a stream of tepid water, until all the starch is removed and the water passes off perfectly clear, when the crude or wet gluten remains, brown coloured, soft and more or less elastic. The latter quality should be noted, although there is no precise means of expressing the degree of elasticity. After all excess of water has been squeezed out of the crude gluten it is made to assume the form of a thin round cake, and weighed in the moist condition. It is afterwards dried in the water bath at 98° C. and the loss of water calculated on the wet or crude gluten. The three results for each sample were thus obtained, which are recorded in Table I. With reference to the percentage of water in the crude gluten, it has been said that it is highest in the flours best adapted for breadmaking, and that the water in glutens from first class flours amounts to 70 p.c., while the medium grades yield glutens containing only 62 to 65 p.c.* These statements are not supported by the numbers given under columns 3, 4 and 5, because none of the crude glutens from the standard samples contain more than 64·6 p.c. water and none of the collected samples yield a gluten with more than 69·8 p.c. The percentages of dry gluten yielded by the Montreal standard samples range from 15·64 to 8·08 per cent. Among the collected samples are some whose dry gluten is beyond these limits. Although consisting essentially of the proteids of the flour, the quantity of dry gluten does not correspond to that of the proteids calculated from the nitrogen percentage given in column 2 of Table I., but is usually much higher. It contains, besides proteids, small quantities of fat, fibre and other substances.

As regards the quality of the various samples a wide variation is also fundamentally exhibited in the percentages of nitrogen given in column 1, which range from 2·23 down to 1·15 per cent. It will be seen that, in calculating the proteids in column 2 from the nitrogen, 5·7 has been substituted for the old factor 6·25. This has been done in deference to the investigations of Osborne & Voorhees, and the practice of Prof. Snyder. Instead of 16, the old percentage of nitrogen which all vegetable proteids and animal albumenoids were assumed to contain, glutenin and gliadin, the chief nitrogenous constituents of wheat, contain respectively 17·49 and 17·66 per cent. The correspond-

* Observations on flours. Balland; Journal of the Society of Chemical Industry, 1895, p. 379.

ing factors for converting the nitrogen into the proteids would be 5·72 and 5·66. In his recent paper on the determination of gliadin* Professor Snyder adopts 5·7 as the factor for the total proteids, which practice it will be convenient to follow in regard to all the different proteids of wheaten flour. From column 2 it will be seen that the wheat proteids contained in the purchased samples vary from 12·71 down to 6·56 per cent, which means that some flours contain twice as much as do others of these valuable flesh and blood forming substances. Among the Montreal standards the proteids range from 10·69 to 7·34 per cent, and it appears that, out of the 75 collected samples, 16 have percentages outside of these limits. Ten are above 10·69 per cent in wheat proteids and six are below 7·34. It will be seen later that some of these have been subjected to a closer chemical examination.

The names given to the Montreal standards must not be taken as affording any indication of the origin of the wheats which yielded the flours. These may come from the winter-grown grain of Ontario, or the hard varieties of Manitoba or may be from mixtures of both. Neither is there anything in the designations of the purchased samples to show from what variety of wheat they are derived. It appears that there is no such thing in these modern times as grinding the whole of any particular lot of grain into flour, shorts and bran. Much more frequently flour is obtained from a mixture of different varieties of wheat, and different grades of flour may be obtained from the one mixture. The art of milling has been revolutionized and its operations are difficult to follow.

It has already been mentioned and will be seen from Table I that the percentage of dry gluten is invariably higher than that of the wheat proteids. This is not surprising, for an average sample of dry gluten consisting of a number of cakes from different flours ground up together was found to contain only 12·40 per cent of nitrogen which corresponds to 70·68 per cent of wheat proteids, or what Jago has called "true gluten." If in the gluten test there were no loss of nitrogenous substances the ratio of proteids to dry gluten would therefore be about 1 : 1·43. This figure is actually reached in the case of "Strong Bakers'" among the Montreal standards and in two brands among the flours made by the Lake of the Woods Milling Co., as will be seen on consulting column 11 of Table I. Among the samples taken in the open market this ratio varies from 1 : 1·41 to 1 : 0·82, but it would be wrong to assume that the lower a flour is in the percentage of proteids, the lower will be the relative quantity of dry gluten which the flour yields. There are flours entered in the table in which the percentage of wheat proteids is about 8 and the proportion of these to dry gluten is 1 : 1·39. On the other hand there are samples with about 11 per cent true gluten in which the ratio in question is as 1 is to 1·12. This ratio would appear however to be of value for indicating the physical character of the gluten in a flour, independently altogether of its percentage. The following quotation from †Jago will help to explain this matter. 'The value of estimations of true gluten as a check on those of crude gluten has already been indicated, but they have also an additional importance. Suppose, for example, two flours each yield 35 per cent of wet gluten. One is hard, elastic and springy, while the other is soft and flabby, and causes the washing water to become 'lathery'. It will at once be said that the former is the higher quality gluten of the two, and quite correctly; but, further, the results would be entered that each yielded the same quantity of gluten. This latter deduction is not all the truth, for in the former case hardness of the gluten will have permitted most of the starch to be entirely eliminated with the least possible loss of real gluten constituents. In the second instance the gluten will have begun to wash away while yet there is a considerable quantity of starch remaining.' It would, therefore, seem reasonable to conclude that the higher the proportion of dry gluten to the wheat proteids or true gluten, the greater is the "strength" of the flour, the firmer the gluten and the less its liability to lose proteids in the washing.

Of late years some authorities have come to the conclusion that a determination of the gliadin in flour is one of much importance. As long ago as 1898, Dr. Emile

*Science and Art of Breadmaking, 1895, p. 514. †Journal of the American Chemical Society, xxvi, p. 26.

Fleurent† wrote thus on the subject :—'The gluten of wheaten flour consists of a mixture of two principal products, the one glutenin, a pulverulent matter; the other gliadin, a viscous sticky flowing substance. It is according to the relative proportions in which these two substances enter into the constitution of different glutens that the latter owe their greater or lesser degree of elasticity and the irregular manner in which they behave during the process of fermentation and baking. A gluten very rich in glutenin is dry and short, it does not rise easily and gives after baking a compact mass; a gluten too rich in gliadin behaves well during fermentation because it is soft and yielding, but, in baking the gliadin dissolves before coagulating, the gaseous products escape, the dough spreads itself and collapses forming a scarcely porous mass and giving the appearance of badly raised bread.' Allen* states that "so far as known, wheat is the only seed the flour of which yields a tough elastic gluten-mass on treatment with water. It is the gliadin which imparts to wheat-flour the property of forming a stiff, elastic dough, capable of retaining vesicles of gas, and thus producing a light and porous loaf.' Not only from a scientific point of view has a determination of the gliadin in wheaten flour been thought desirable but practical millers in the United States have deemed the matter to be worthy of attention and have endeavoured to ascertain the percentage of this proteid in the wheat they purchase and the flours they manufacture. Reference has already been made to Prof. Snyder's process for this purpose. On the other hand doubts have been expressed as to the utility of such a determination, and, in a very recent article on flour†, Hans Stein, a millowner in Silesia remarks that Fleurents method of separating gluten into its constituents had led to no comprehensible results. Nevertheless from the point of view of the ordinary miller and consumer it seems desirable to attempt the estimation of gliadin and to make closer analyses of wheaten flour for the purpose of ascertaining the essential differences in the qualities of the various flours found on the market, and the value of the names attached to the samples which are each year put forward as standards by the representatives of the grain trade.

It was found impossible to subject all the samples collected to this closer examination but a selection was made from among the samples described in Table I, and the results of their analysis are given in Table II, most of the work connected with which was done by Miss S. E. Wright. The headings in this table explain themselves for the most part, but it seems necessary to describe briefly the manner of operating, and explain how the results tabled under Alcohol Extract were obtained. In order thoroughly to expose the particles of flour to the action of the various solvents, it was distributed through crysotile fibre (Canadian asbestos) placed in so-called Macfarlane tubes which had previously been furnished with a filtering bed. The tube used has a total depth of 75 mm. of which 15 mm. are occupied by the tubulature at the bottom. The body of the tube is 60 mm. long with an outside diameter of 40 mm. A small piece of fine wire gauze is placed over the tubulature and upon this a small quantity of crysolite fibre. Over this a fine filtering bed is laid by pouring into the tube, placed over the water pump, a small quantity of pulp made of hornblendic asbestos, similar to that used for the Gooch crucible. The rest of the tube is filled up with crysotile fibre, through which the flour submitted to analysis is distributed. After drying and extracting with petrolic ether, the tubes are treated in the extraction apparatus with alcohol of 60 per cent by volume. In this as in the fat extraction, the solvent is boiled on a plate heated electrically, and thus all danger from the breaking of a flask and the inflammability of the solvents avoided. On boiling the 60 per cent alcohol in the lower flask it returns from the condenser of a strength varying from 80 to 85 per cent by volume and percolates the tubes. The extraction is completed in seven hours, but it has sometimes been found convenient to start it at night and allow it to continue till morning, unattended, which can be done without danger. Two tubes are extracted together each containing $2\frac{1}{2}$ grammes, and, by drying and weighing these, the loss sustained by the flour is ascertained. The extract from these 5 grammes is deprived of its alcohol,

* Organic Analysis IV, p 75. † Zeitschrift für Untersuchung der Nahrungs und genussmittel, 1904, p 730.
† Manuel d'Analyse Chimique, p 310.

and then divided into equal parts, one of which is used for determining the nitrogen by the Kjeldahl method, and the other for the estimation of the sugars. The sum of these determinations subtracted from the loss sustained by the flour gives the amount of non-nitrogenous substances extracted by the alcohol. The gliadin in the alcohol extract is ascertained on multiplying its nitrogen by 5·7. On deducting the gliadin from the total proteids the quantity present is ascertained of glutenin and other proteids insoluble in alcohol. From the relative quantities of total proteids and gliadin the figures given in the last column are obtained. How far this percentage of gliadin in the total proteids has any practical value cannot at present be decided. Among some of the collected flours it is as low as 28 per cent, but it has to be remembered that some of these were selected for closer examination because of their abnormal characters in other respects.

It may be stated that the average sample of dried gluten referred to above was subjected to the same examination as the samples in Table II and gave the following results :—

	Per-centage.
Total nitrogen	12·40
" proteids (N × 5·7)	70·68
Moisture	3·68
Fat	0·36
Alcohol extract, containing—	
Reducing sugar stated as dextrose	0·43
Sugar after inversion stated as sucrose	0·41
Gliadin (N of alcohol extract × 5·7)	5·52
Non-nitrogenous substances	7·92
Water extract	2·72
Glutenin and other proteids insoluble in alcohol	65·15
Total ash	2·72
Starch and fibre (by difference)	11·09
	100·00

These results were confirmed by an experiment made on crude or wet gluten. From this it appears that dry gluten contains on the average only 70·68 p.c. of proteids and that of these only 5·52 parts are soluble in alcohol. Since the proteids in wheat flour contain from 32 to 58 p.c. of gliadin or alcohol soluble proteid, it would appear that in the gluten test a considerable percentage must be carried away by the water. If the proteids in the dry gluten operated on had contained say 45 p.c. of gliadin then 31·95 p.c. of the gluten should have been extracted by alcohol : whereas the total alcohol extract is only 14·28 and of this only 5·52 is gliadin. It may, however, be the case, as has been maintained by other observers, that gluten as such does not preexist in flour, or that its constituents enter into a state of more intimate combination under the influence of water when the flour comes to be made into dough.

The present report is to be regarded as the first contribution from this laboratory on the analysis of flour. Unfortunately I am at present unable to say with certainty in what respects all the results now submitted coincide with or illustrate points in the miller's practical experience. I hope, however, that this report, if published, may attract the attention of practical men, and that I may hereafter have an opportunity of consulting with them and possibly of reaching more definite conclusions.

I have the honour to be, Sir, your obedient servant.

THOMAS MACFARLANE.
Chief Analyst.

INSPECTION OF WHEATEN FLOUR—

Date of Collection.	Nature of Sample.	Number of Sample.	Name and Address of Vendor.	Cost. Quantity.	Cost. Price.	Name and Address of Manufacturer or Furnisher as given by Vendor.
1903.	*Halifax District.*			Lbs.	Cts.	
Jan. 27	Splendid Brand	20422	D. Wood, Windsor, N.S.	4½	15	Delong & Lamen, Boston, Mass.
" 27	.....	20424	Graham & Co., Windsor.	....	....	Flavelle Milling Co., London, Ont.
" 27	.....	20426	Murphy & DeMont, Windsor.	.....	....	Wolverston Milling Co., Ont.
" 27	Sunbeam	20432	Brown & Graham, Halifax.	.....	..	Not stated.....
" 27	.....	20434	R. T. Forristall, Halifax.	.....	14	Ratz Bros., Ont.....
" 27	Golden Crown.... ..	20438	M. J. Hopgood " ..	.....	....	Wood Bros., Ont.. ..
" 27	Halifax.....	20440	Burgess & Quinn " ..	.....	.....	Kent Milling Co., Ont...
" 27	Queen City	20442	H. W. Wentzell & Co., Halifax.	.....	...	A. Campbell, Toronto Junction.
	Prince Edward Island District.					
" 26	Wheat Flour....	24402	Bur & Goff, Charlottetown.	1½	5	Tilson & Co..... .. ..
" 27	"	24406	Brace & McKay, Summerside.	.....	4	Brock Milling Co.. ...
	New Brunswick District.					
	Wheat Flour—					
Jan. 23	'Golden Star'.....	23807	W. F. Campbell, 16 Germain St., St. John.	3	10	Jas. Goldie, Waterloo, Ont.
" 23	'Royal Household'.	23808	J. F. Shaw, cor. Waterloo and Golding Sts., St. John.	1½	6	Ogilvie Milling Co., Montreal.
	Family flour—					
" 28	'White Satin'.....	23813	The (2) Barkers, Ltd., 287 Main St.. Moncton.	1½	10	Jas. Cullen, Woodstock. Ont.
" 28	'Five Roses'..... (Pastry Flour)	23814	John O'Neil, Main St., Moncton, N.B.	1½	10	Lake of the Wood Milling Co., Keewatin.
Feb. 4	Home Trade.. . . . (Pastry Flour)	23818	Hughes & Maxwelle, King St., St. Stephen, N.B.	1½	10	Rolph Smith & Co., Toronto, Ont.
" 5	Harvest Moon.... . (Pastry Flour)	23821	John McKnight, Regent St., Fredericton.	....	.....	A. F. Randolph & Sons, Fredericton.
	Quebec District.					
Jan. 25	Wheat Flour...	23651	Aug. Beausoleil, Terrebonne.	1½	5	H. P. Labelle, Montreal.
" 26	"	23653	J. J. Soumis, Joliette...	1½	5	The Alexander Brown Milling Co.
" 27	"	23659	Paquette Frères, Berthierville.	1½	6	Z. Boulanger, Berthierville.

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TABULATED STATEMENT, I.

Results of Examination.

1 Total Nitrogen.	2 Wheat Proteids N × 5·7.	Gluten. 3 Crude.	Gluten. 4 Dry.	Gluten. 5 Water in crude.	Bolting. 6 Coarser than No. 10.	Bolting. 7 Between 10 and 12.	Bolting. 8 Finer than 12.	9 Acidity, stated as Lactic Acid.	10 Total Ash.	11 Ratio of Proteids to Dry Gluten.	No. of Sample.	Name of Analyst.
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		
1·68	9·58	29·50	11·83	66·95	0·16	1·32	95·27	0·108	0.44	1:1·23	20422	J. G. A. Valin.
1·89	10·77	24·14	8·84	63·3	0·15	12·49	78·68	0·094	0·26	1:0·82	20424	" Wheat starch only; A. Lemoine.
1·40	7·98	23·11	7·86	65·98	0·20	6·50	87·01	0·101	0·68	1:0·98	20426	J. G. A. Valin; wheat starch only; A. Lemoine.
1·48	8·44	29·99	11·40	61·98	0·68	6·76	86·72	0·072	0·52	1:1·35	20432	J. G. A. Valin.
1·61	9·17	34·57	13·01	62·36	0·07	7·20	85·54	0·072	0·36	1:1·41	20434	"
1·47	8·38	23·31	8·34	64·22	0·08	12·85	80·08	0·108	0·40	1:0·99	20438	" wheat starch only; A. Lemoine.
1·54	8·78	28·29	9·85	65·01	0·27	6·26	84·52	0·115	0·48	1:1·12	20440	" "
1·54	8·78	28·93	11·08	64·17	0·17	9·89	89·92	0·130	0·84	1:1·26	20442	J. G. A. Valin.
1·47	8·37	25·68	8·40	67·29	0·16	6·27	97·32	0·101	0·11	1:1·01	24402	Miss E. Davidson; wheat starch only A. Lemoine.
1·40	7·98	26·54	8·92	66·39	0·24	1·00	97·72	0·129	0·11	1:1·12	24406	" "
1·15	6·56	23·67	8·62	53·59	0·32	2·51	96·43	0·108	0·11	1:1·31	23807	" "
1·88	10·72	38·07	12·70	66·64	0·36	6·35	92·37	0·122	0·05	1:1·18	23808	Miss E. Davidson.
1·40	7·98	28·32	9·52	66·38	0·08	4·00	95·96	0·123	0·11	1:1·19	23813	" wheat starch only; A. Lemoine.
1·71	9·75	33.59	11·97	64·33	0·76	12·00	86·00	0·094	0·16	1:1·23	23814	Miss E. Davidson.
1·55	8·84	29·07	9·74	66·49	0·08	3·84	95·60	0·108	0·14	1:1·10	23818	" wheat starch only; A. Lemoine.
1·55	8·84	29·37	9·55	67·48	0·18	4·61	92·40	0·101	0·10	1:1·08	23821	" "
1·51	8·60	25·72	10·21	60·30	0·10	2·02	96·02	0·158	0·52	1:1·18	23651	J. G. A. Valin; wheat starch only; A. Lemoine.
1·15	6·56	19·56	6·60	66·25	0·04	1·04	98·54	0·108	0·02	1:1·00	23653	" "
1·43	8·15	27·45	9·90	63·93	0·04	14·40	84·96	0·194	0·08	1:1·21	23659	J. G. A. Valin.

INSPECTION OF WHEATEN FLOUR—

Date of Collection.	Nature of Sample.	Number of Sample.	Name and Address of Vendor.	Cost. Quantity.	Cost. Value.	Name and Address of Manufacturer or Furnisher as given by Vendor.
1904.	*Quebec District*—Con.			Lbs.	Cts.	
Jan. 27	Wheat Flour	23661	L. J. Giroux & Cie.	1½	5	Z. Boulanger, Berthierville.
" 28	"	23663	Thos. Bournival, Trois Rivières.	1½	3	David Murphy, Montreal
" 29	"	23670	L. Gingras, 304 Richilieu, Quebec.		9	Poitras & Paradis, Que.
" 29	"	23672	S. Hamel, 106 D'Aiguillon St., Que.		5	J. B. Renaud et Cie., Quebec.
" 29	"	23675	Mrs. F. Coveny, 2 St. Patrick St., Que.		5	D. Z. Drolet, Quebec.
" 29	Stockwell's Patent	23677	H. G. Kell, 80 St. Augustin.			
Feb. 4	"	23679	E. Lafontaine. Drummondville.	1½	4	Lake of the Woods Milling Co., Montreal.
" 4	"	23683	Oscar Piché, Drummondville.		5	E. Lafontaine, Drummondville.
" 5	"	23684	Demers & Lorange, Notre Dame of St. Hyacinthe		4	S. Papillon, Notre Dame of St. Hyacinthe.
" 5	"	23685	Gustave Jeannotte, St. Joseph de St. Hyacinthe.	3	13	Viau Frères, St. Hyacinthe.
	Montreal District.					
	Wheat flour—					
Jan. 10	'Champion'	23184	A. Fournier, 1789 St. Catherine St.	2	6	
" 20	'Ocean Brand'	23185	C. E. Authier, 1758 St. Catherine St.	1½	6	
" 20	'Patent'	23186	A. Mercier, 498 Dorchester St.		5	
" 20	'First Prize'	23187	L. G. Thouin, 487 Lagauchetierre St.	2	6	
" 21		23188	M. F. Lafortune, 116 St. Maurice St.	1½	6	Laporte, Martin & Co.
" 21	'Champion'	23189	Pilons & Meilleur, 114 St. Maurice St.		5	
" 21		23190	A. Lamy, 2021 Notre Dame St.			Magor Bros. & Co.
" 21		23191	Joseph Deneau, 53 Juror St.			Howe, McIntyre & Co.
" 22		23192	A. Massicotte & Co., 1472 St. Catherine St.		6	C. Roy, Montreal.
" 22	Eagle Brand.	23193	T. Bergeron, 1522 St. Catherine St			
" 22	'White Bread' Brand.	23194	C. Coderre, 1358 Notre Dame St.			
22	'Bijou'	23195	G. St. Pierre, 1350 Notre Dame St.			

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TABULATED STATEMENT, 1—*Continued.*

RESULTS OF EXAMINATION.

Total Nitrogen. 1	Wheat Proteids N × 5·7. 2	Gluten. Crude. 3	Gluten. Dry. 4	Gluten. Water in Crude. 5	Bolting. Coarser than No. 10. 6	Bolting. Between 10 and 12. 7	Bolting. Finer than 12. 8	Acidity, stated as Lactic Acid. 9	Total Ash. 10	Ratio of Proteids to Dry Gluten. 11	Number of Sample.	Observations.
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		
1·61	9·17	27·28	11·27	59·43	0·04	1·28	98·57	0·100	0·30	1:1·22	23661	J. G. A. Valin.
1·41	8·04	24·64	8·87	64·00	0·02	3·10	94·13	0·130	0·10	1:1·10	23663	" wheat starch only: A. Lemoine.
1·40	7·98	25·30	9·34	60·30	0·08	4·30	94 20	0·122	0·46	1.1·17	23670	" "
1·53	8·72	27·42	10·40	62·07	0·02	1 68	97·82	0·158	0·32	1:1·19	23672	" "
1·47	8 38	27·27	9·32	65·82	0·01	1·25	98·16	0·137	0·10	1:1·11	23675	" "
1·51	8·60	25·92	9·97	61·52	0 00	1·60	98·32	0·072	0·40	1:1·15	23677	" "
1·55	8·84	28·50	11·26	60·49	0·00	3·52	95·57	0 158	0·60	1:1·27	23679	J. G. A. Valin.
1 40	7·98	24 72	11 08	59·59	0·08	2·75	96·44	0 100	0·10	1:1 38	23683	"
2·07	11·80	31·48	12·83	59·24	0·46	13 68	85·72	0·120	0 12	1:1·08	23684	" wheat starch only: A. Lemoine.
.....	.....	....	.....	.....	.....	...	. ..	...	....	...	23685	This sample was not tested, being a self-raising flour.
1·316	7·50	28·08	9·98	.....	0·02	0·91	98 82	0·158	0·36	1:1·33	23184	Miss S. E. Wright.
1·365	7·78	29·45	10·85	.....	0·08	1·84	97·48	0·122	0·44	1:1·39	23185	"
1 351	7 70	25·20	8·61	....	0·03	2·93	96·77	1·130	0·12	1:1·12	23186	" wheat starch only; A. Lemoine.
1·386	7·90	26·77	10·05	.	0·60	6·32	92·55	0·137	0·22	1:1·26	23187	Miss S. E. Wright.
1·40	7·98	23·56	7·84	66·7	0·12	2·95	undet.	0.101	0·40	1:0·98	23188	Miss E. Davidson; wheat starch only; A. Lemoine.
1 62	9·24	31·58	10 49	66·7	0·05	1·71	"	0 129	0·28	1:1·13	23189	" "
1·51	8·61	32·99	9·94	69·8	0·04	2·60	"	0·129	0·50	1:1·15	23190	" "
1·61	9·18	29·10	9·70	66·6	0·04	2·61	"	0 101	0·45	1:1·06	23191	" "
1·86	10·60	33·48	11·83	65·7	0·07	7·04	"	0·245	0·85	1:1·11	23192	" "
1·51	8·61	28·58	8·80	69·2	0·06	1·46	"	0·108	0·40	1:1·02	23193	" "
1·54	8·78	29·13	9·78	66·4	0·06	1·18	"	0·101	0·43	1:1·11	23194	" "
1·55	8·84	29·85	9·85	67·0	0·04	0·56	"	0·165	0 15	1:1·12	23195	" "

INSPECTION OF WHEATEN FLOUR—

Date of Collection.	Nature of Sample.	Number of Sample.	Name and Address of Vendor.	Cost. Quantity.	Cost. Price.	Name and Address of Manufacturer or Furnisher as given by Vendor.
1904.	*Kingston District.*			Lbs.	Cts.	
Jan. 28	Pastry flour	25008	Peter Glavey, 37 York St., Ottawa.	1½	6	
" 28	'Gem'	25009	H. O. Richer, 31 York St., Ottawa.		5	
" 28	"	25010	P. L. Foisy, 297 Dalhousie St., Ottawa.		6	McEvoy & Son
" 29	'C' Brand	25011	A. D. Adams, King St., Brockville.		5	Jas. Cummings, Lyn, Ont.
" 29	'A' "	25012	Wm. Rhodes, King St., Brockville.		4	" "
" 29	Hungarian	25013	T. Brown & Co., King St., Brockville.		5	Ogilvie Milling Co.
" 29	Hunts Best	25014	" "			Hunt Bros., London
	Toronto District.					
Feb. 2	Elgin Brand	25030	James Irvine, 552 Queen St. West, Toronto.	1½	5	John Campbell, St. Thomas.
" 2	Monarch	25031	" "	1½	5	Arch. Campbell, Toronto.
" 2	Jubilee	25032	J. Bond, 559 Queen St. West, Toronto.	1½	5	Citizen Milling Co.
" 3	Eagle Brand	25033	A. Janatta & Co., 400 Queen St. W., Toronto.	1½	5	Fairless Milling Co.
" 3	Golden Cream	25034	J. Summer, 306 Queen St. West, Toronto.	1½	5	
" 3	Gold Medal	25035	D. Sutherland, 295 King St. East, Hamilton.	1½	5	Lake & Bailey
" 3	White Rose	25036	F. H. Blain, 87 John St., Hamilton.	1½	5	John Thompson
" 3	Gold Medal	25037	" "	1½	5	Lake & Bailey
	London District.					
Jan. 23	Crest	22186	A. G. Ault, Seaforth	1	3	Seaforth Milling Co., Seaforth.
" 27	'Juliet'	22190	John Byers, Stratford, Ont.	1	3	Stratford Milling Co.
" 28	'Daily Bread'	22192	Webber & Co., Berlin	1	3	Shirk & Snider, Bridgeport, Ont.
" 28	'Maple Leaf'	22196	J. A. McCray, Guelph	1	3	James Goldie, Guelph
" 29	"	22199	Armstrong Bros., Fergus.	1	3	Grand Valley Mills
Feb. 6	"	22202	H. Levins, Seaforth	1	3	H. F. McAllister, Ethel, Ont.
" 6	Three Star	22205	T. J. Vidian, Goderich	1	3	Goderich Milling Co.
	Winnipeg District.					
Feb. 9	Flour	23924	Metcalf & Mitchell, Brandon	1½	5	Ogilvie Milling Co.
" 10	"	23928	M. R. Shurman, Virden.			Oak Lake Milling Co.

SESSIONAL PAPER No. 14

TABULATED STATEMENT, I—*Continued.*

RESULTS OF EXAMINATION.

1 Total Nitrogen.	2 Wheat Proteids N × 5·7.	Gluten. 3 Crude.	Gluten. 4 Dry.	Gluten. 5 Water in crude.	Bolting. 6 Coarser than No. 10.	Bolting. 7 Between 10 and 12.	Bolting. 8 Finer than 12.	9 Acidity, stated as Lactic Acid.	10 Total Ash.	11 Ratio of Proteids to Dry Gluten.	Number of Sample.	Observations.
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		
2·23	12·71	42·26	15·86	62·4	0·08	8·00	90·60	0·115	0·67	1:1·25	25008	Miss E. Davidson.
2·21	12·60	43·94	15·18	65·5	0·05	2·85	95·68	0·173	0·67	1:1·20	25009	"
1·75	9·98	34·15	13·08	61·43	0·01	7·32	92·74	0·201	0·51	1:1·31	25010	"
1·73	9·86	36·28	12·67	65·08	0·01	7·22	92·37	0·144	0·42	1:1·28	25011	"
1·43	9·15	31·07	10·29	66·88	0·28	5·28	94·36	0·122	0·42	1:1·26	25012	"
1·75	9·98	37·07	13·94	62·39	0·01	15·64	84·33	0·144	0·32	1:1·39	25013	"
1·63	9·29	33·75	12·79	62·10	0·02	20·44	79·60	0·165	0·52	1:1·37	25014	"
1·34	7·64	30·44	10·30	66·16	0·02	2·96	96·60	0·122	0·64	1:1·34	25030	Miss E. Davidson.
1·38	7·58	20·51	8·76	57·29	0·02	0·42	99·25	0·115	0·58	1:1·16	25031	" wheat starch only; A. Lemoine.
1·40	7·98	29·13	9·96	65·81	0·05	16·64	82·60	0·115	0·48	1:1·25	25032	Miss E. Davidson.
1·26	7·18	22·25	7·38	66·83	0·00	0·75	98·93	0·130	0·64	1:1·03	25033	Alph. Lemoine; no foreign starch.
1·33	7·58	21·24	7·38	65·24	0·02	1·70	97·84	0·100	0·38	1:0·97	25034	" "
1·40	7·98	22·94	7·88	65·60	0·00	1·46	98·18	0·129	0·50	1:0·98	25035	" "
1·19	6·78	20·06	8·44	57·93	0·00	0·44	99·14	0·115	0·48	1:1·24	25036	"
1·33	7·58	27·47	9·00	67·23	0·00	2·03	97·90	0·108	0·48	1:1·19	25037	" "
1·49	8·49	29·18	9·19	68·50	0.00	0·88	98·89	0·108	0·44	1:1·08	22186	Alph. Lemoine; wheat starch only.
1·44	8.20	28·74	9·33	71·46	0·00	0·82	98·89	0·100	0·48	1:1·37	22190	" "
1·47	8·37	31·12	10·36	66·70	0·00	1·00	98·87	0·108	0·42	1:1·24	22192	Alph. Lemoine; wheat starch only.
1·55	8·86	27·22	9·99	63·29	0·04	5·04	94·56	0·115	0·44	1:1·13	22195	Miss E. Davidson; wheat starch only.
1·67	9·50	33·29	11·82	64·49	0·01	3·28	96·80	0·130	0·50	1:1·24	22199	Miss E. Davidson.
1·57	8·94	31·71	11·39	64·08	0·02	0·68	99·00	0·108	0·42	1:1·17	22202	"
1·97	11·25	40·97	14·89	63·66	0·00	4·44	95·60	0·137	0·38	1:1·32	22205	"
2·02	11·49	42·88	14·81	65.54	0·00	10·16	89·82	0·122	0·42	1:1·29	23924	Miss E. Davidson.
1·93	11·01	34·44	12·34	64·16	0·01	3·58	96·12	0·101	0·36	1:1·12	23928	" wheat starch only; A. Lamoine.

INSPECTION OF WHEATEN FLOUR—

Date of Collection.	Nature of Sample.	Number of Sample.	Name and Address of Vendor.	Cost. Quantity.	Cost. Price.	Name and Address of Manufacturer or Furnisher as given by Vendor.
1903.	*Winnipeg District*—Con.			Lbs.	Cts.	
Feb. 12	Flour.	23930	Matheson Bros., Winnipeg.			Ogilvie Milling Co..
" 12	"	23933	W. E. Innis, Winnipeg..			Lake of the Woods Milling Co.
	Calgary District.					
Feb. 10	Wheat flour	21777	H. A. Thompson, Strathcona, Alta	1½	5	Edmonton Milling Co., Edmonton
" 10	"	21780	Larue & Picard, Edmonton, Alta	1½	5	The Dowling Milling Co., Edmonton
	British Columbia District.					
Feb. 2	Wheat flour	24921	W. Findlay, Vancouver.	4½	0 15	Hudson Bay Co., Man..
" 5	"	24930	H. A. Edgett & Co., Vancouver..	4½	0 10	Ogilvie, Man.
" 5	"	29431	Dominion Grocery Co., Vancouver..	4½	0 25	D. McLean, Moosejaw Mills
" 8	"	24932	C. G. Turner, Vancouver	4½	0 15	Columbia Flouring Mills, Ltd., Enderby, B.C.
" 8	"	24933	J. F. May "	4½	0 15	Portland Flouring Mills, Portland, Oregon
" 8	"	24934	E. H. McMillan "	4½	0 25	Lake of the the Woods Milling Co., Keewatin
	Standard samples for the year 1903, obtained from Montreal Board of Trade.					
	Strong baker's					
	Patent spring					
	Superfine					
	Fine					
	Extra					
	Straight roller					
	Patent winter					
	Samples from Lake of the Woods Milling Co.—					
	Medora					
	Strong bakers					
	Five Roses					
	Patent					

SESSIONAL PAPER No. 14

TABULATED STATEMENT I—*Concluded.*

RESULTS OF EXAMINATION.

Total Nitrogen. 1	Wheat Proteids, N × 5.7. 2	Gluten. 3 Crude.	Gluten. 4 Dry.	Gluten. 5 Water in Crude.	Bolting. 6 Coarser than No. 10.	Bolting. 7 Between 10 and 12.	Bolting. 8 Finer than 12.	Acidity, stated as Lactic Acid. 9	Total Ash. 10	Ratio of Proteids to Dry Gluten. 11	No. of Sample.	Name of Analyst.
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		
1·96	11·17	39·57	14·41	63·58	0·01	12·88	87·04	0·144	0·50	1:1·29	23930	Miss E. Davidson.
1·88	10·69	36·00	12·97	63·97	0·01	1·67	98·29	0·101	0·40	1:1·21	23933	"
1·652	9·41	39 31	13·27	66·24	0·01	6·73	92·91	0·216	0·68	1:1·41	21777	Miss E. Davidson.
1·630	9·29	29·85	10·52	64·74	0·14	2·12	96·60	0·151	0 48	1:1·13	21780	"
1·680	9·58	35·12	12·62	64 06	0·00	3·94	96·01	0 108	0·46	1:1·31	24921	"
1·960	11·17	44·79	15·70	64·94	0 98	9·70	90·20	0·144	0·48	1:1·40	24930	"
1·036	5·91	22·50	7·79	65·38	0·01	0·89	98·69	0·115	0·46	1:1·32	24931	"
1·740	9·92	39·86	13·32	66·58	0·02	0·36	99 27	0·122	0·42	1:1·34	24932	"
1·050	5·98	20·93	7·39	64·69	0·01	1·82	97·70	0·108	0·46	1:1 24	24933	"
1·666	9·50	32·96	11·88	63·95	0·01	7·76	91 58	0·101	0·32	1:1·25	24934	"
1·876	10·69	41·27	15·64	62·1	1·63	11·13	85·80	0·173	0·68	1:1·46		
1·841	10·49	37·29	13·20	64·6	1·76	14·81	82·94	....	0·16	1:1·26		
1·834	10·45	32·26	12·02	62·7	0·28	1·73	96·22	.....	0·82	1:1·15		
1·792	10·21	31·93	12·52	60·6	4·08	15·62	80·20	.....	0·54	1:1·22		
1·687	9·62	34 90	12·92	62·9	0·08	5·48	93·01	.....	0.52	1:1·34		
1·386	7·90	24·90	8·86	60·4	0·04	4·07	95·21	.....	0 10	1:1·12		
1·288	7·34	22 32	8·08	63·7	0·08	5·31	93·58	.....	0·18	1:1·10		
2·149	12·24	43·83	16·71	61·8	0·03	5·27	94·56	0·245	0·30	1:1·36		
2·016	11·49	42·01	16·82	59·9	0·02	2·79	95·68	0·194	0·36	1:1·46		
1·827	10 41	36 91	13·64	63·0	0·03	10·56	89·28	0 137	6·16	1:1·31		
1·743	9·94	44·57	17·42	60·9	0·04	4·63	95·12	0·144	0·16	1:1 75		

TABLE II.—Results of the Analyses of Certain Samples of Wheaten Flour.

	No. of Sample.	Total Proteids N × 5·7.	Moisture.	Fat.	Extracted by Alcohol.						Total Ash.	Starch and Fibre by difference.	Percentage Gliadin in total Proteids.
					Reducing Sugar or Dextrose.	Sugar after inversion as Sucrose.	Non-Nitrogenous substances.	Gliadin.	Extract by Water after Alcohol.	Glutenin and other Proteids insol. in Alcohol.			
		p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.
Standard Flours from Board of Trade, Montreal—													
Strong Bakers	.....	10·69	8·61	0·76	0·08	0·85	3·58	5·65	0·48	5·04	0·68	74·24	52·85
Patent Spring	.....	10·49	8·00	1·90	0·12	1·80	2·16	5·84	1·75	4·65	0·16	73·61	55·67
Superfine	.....	10·45	8·68	0·92	0·58	1·78	1·04	3·36	5·48	7·09	0·82	70·25	32·15
Fine	.....	10·21	7·52	1·00	0·43	3·84	1·50	1·39	3·36	5·82	0·54	61·60	42·99
Extra	.....	9·62	8·84	0·74	0·31	1·18	0·63	4·56	3·92	5·06	0·52	74·24	47·40
Straight Roller	.....	7·90	8·88	0·30	0·66	0·11	1·98	4·50	2·32	4·38	0·10	76·77	56·96
Patent Winter	.....	7·34	8·16	0·30	0·23	1·11	0·00	1·28	2·68	3·88	0·18	79·18	58·31
Samples from Lake of the Woods Milling Co., Montreal—													
Medora	.....	12·24	10·20	0·80	0·12	1·99	2·56	5·52	0·92	6·72	0·30	70·87	50·09
Strong Bakers	.....	11·49	8·64	0·86	0·04	1·68	2·79	5·65	0·32	5·81	0·36	73·82	49·17
Five Roses	.....	10·11	12·20	1·94	0·08	0·77	4·60	1·96	0·40	5·45	0·16	69·44	47·64
Patent	.....	11·17	10·40	0·51	0·29	1·13	2·28	5·58	3·32	5·59	0·16	70·71	49·12
Samples collected in the open market as shown in Table I—													
Graham & Co., Windsor, N.S.	20424	10·77	9·32	0·84	0·19	0·31	1·38	3·99	1·92	6·78	0·26	65·01	37·04
Murphy & Demont, "	20426	7·98	9·42	0·88	0·31	0·52	1·48	1·16	2·16	3·82	0·68	76·77	52·13
W. F. Campbell, St John, N.B.	23807	6·56	9·60	0·66	0·27	1·24	0·00	3·57	3·56	2·99	0·11	78·00	54·42
J. F. Shaw, "	23808	10·72	9·72	0·64	0·46	0·26	2·21	1·39	0·86	6·23	0·05	75·18	40·95
J. J. Soumis, Joliette, P.Q.	23653	6·56	8·54	0·80	0·27	1·33	1·48	2·68	1·60	3·88	0·02	79·40	40·85
Demers & Lorange, St. Hyacinthe	23684	11·80	9·48	1·40	0·60	0·24	0·91	5·70	1·00	6·10	0·12	74·42	48·35
Peter Glavey, Ottawa	25008	12·71	9·96	0·60	0·46	0·08	1·50	5·24	2·68	7·47	0·67	71.34	41·23
H. O. Richer, "	25009	12·60	7·84	0·58	0·35	1·21	3·79	3·35	3·72	9.25	0·67	69·04	28·33
A. Janatta & Co., Toronto	25033	7·18	10·92	0·64	0·41	1·87	0·00	3·16	3·84	4·02	0·64	74·50	44·01
F. H. Blain, Hamilton	25036	6·78	9·88	0·36	0·35	0·35	0·94	2·52	2·28	4·26	0·48	78·58	37·17
T. G. Vidian, Goderich	22205	11·25	11·08	0·14	0·31	0·74	2·98	4·63	4·16	6·62	0·38	68·96	41·16
Metcalfe & Mitchell, Brandon, Manitoba	23924	11·49	10·26	0·32	1·43	0·38	2·03	3·36	0·00	8·13	0·42	73·67	29·24
M. R. Shurman, Virden, Man.	23928	11·01	10·32	0·80	0·39	0·06	0·19	3·36	1·32	7·65	0·36	75·55	30·52

APPENDIX M.

BULLETIN No. 99—TEA.

OTTAWA, July 27, 1904.

W. J. GERALD, Esq.,
Deputy Minister of Inland Revenue.

SIR,—I submit herewith a report by Mr. McGill concerning seventy-three samples of tea collected in April and May last, in accordance with your instructions of January 14, 1904. The report is accompanied by a tabulated statement showing the origin of the various samples as well as the result of the examinations.

I have the honour to be, sir,
Your obedient servant,

THOMAS MACFARLANE.
Chief Analyst.

LABORATORY OF THE INLAND REVENUE DEPARTMENT,
OTTAWA, May 23, 1904.

THOS. MACFARLANE, Esq., F.R.S.C.,
Chief Analyst.

SIR,—I beg to hand you herewith a report upon seventy-three samples of tea, including as follows:

Black teas	50 samples.
Green and Japan	23 "
	73

You will observe that two samples included in the Inspector's invoices have not come to hand. These are Nos. 20470 and 20471.

These samples, without exception, possess the botanical characters of the tea leaf; and the extractive is high enough to give proof that they have not undergone any exhaustion with water. The ash is normal, and they must therefore be recognized as genuine teas.

Except so far as the size of the leaf, its broken character, the presence of excess of stems and tea dust are concerned, I have done nothing to determine the quality or grade of the teas in question. The object of this examination has simply been to ascertain the specific genuineness of the samples as tea.

I have the honour to be, sir,
Your obedient servant,

A. McGILL.

INSPECTION OF TEA.—Tabulated Statement.

Date.	Nature of Sample.	Number of Sample.	Name and Address of Vendor.	Cost.	Name and Address of Manufacturer or Furnisher as given by Vendor.	Result of Analysis. Specific gravity of 10 p.c. extract.	Total Ash.	Botanical Examination	Observations.	Number of Sample.
1904.	*District of Nova Scotia.*			Lb. Cts.		p. c.	p. c.			
April 12	Tea, bulk	20445	J. W. Hebb, Bridgewater, N.S.	1 20	Bauld Bros., Halifax	1·0115	5·58	Tea leaves, large, broken	Genuine	20445
" 12	" Red Rose brand	20447	H. C. Barnaby & Sons, Bridgewater.	1 30	T. H. Esterbrooke, St., John, N.B.	1·0107	5·66	Tea leaves, broken	"	20447
" 15	" bulk	20455	S. L. Cross, Kentville, N.S.	1 30	Baird & Peters, St. John, N.B.	1·0117	5·54	Tea leaves, much broken	"	20455
" 15	" Universal Blend	20456	W. Smith, Kentville, N.S	1 40	Daniels & Wise, London, Eng.	1·0122	5·32	Tea leaves, broken	"	20456
" 15	" Jernsalem Blend	20464	W. T. Stephens, Wolfville, N.S.	1 40	J. W. Gorham, Halifax, N.S.	1·0105	5·28	Tea leaves, large and many stems.	"	20464
" 15	" Imperial Blend	20466	H. Wentzell & Co., Halifax, N.S.	1 20	Burbridge, Pritchard & Bartlett, London, Eng.	1·0105	5·66	Tea leaves, large, much broken.	"	20466
" 15	" Halifax Blend	20470	F. P. Campbell & Co., Halifax, N.S.	1 30	Unknown			Sample not received.	"	20470
" 15	" bulk	20471	Craig & Hudson, Halifax	1 25	John Tobin & Co., Halifax, N.S.			Sample not received.	"	20471
	District of Prince Edward Island.									
April 28		24410	Stewart & Son, Charlottetown, P.E.I.	1 25	Blended by themselves	1·0121	5·16	Tea leaves, medium size, much broken, stems.	Genuine	24410
May 3		34416	Sinclair & Stewart, Summerside, P.E.I.		Burbridge, Pritchard & Bartlett, London, Eng.	1·0119	4·76	Tea leaves, medium	"	24416
	District of New Brunswick.			Pkgs.						
April 7	Black tea, Vim	23824	Baird & Peters, 21 South Wharf, St. John.	3 75	Blended and packed by vendors.	1·0121	5·24	Tea leaves, large and broken.	Genuine	23824
" 7	" Red Rose brand.	23825	Charles F. Francis & Co., 141 Charlotte St., St. John.	1 10 Lb.	Blended and packed by T. H. Esterbrooke, St. John	1·0132	4·96	Tea leaves	"	23825

"	13	" Nectar.....	23829	Inches & Grimmer, Water St., St. Stephen, N.B.	1 Tins.	40	Purvis & Graham St. Stephen, N.B.	1·0122	4·84	Tea leaves, with much dust.	"	23829
"	15	Black China tea	23832	T. M. Richards, Edmundston, N.B.	3 Lb.	30	Imported through C. H. Clarke, St. Stephen, N.B.	1·0099	5·56	Tea leaves, broken, many stems.	"	23832
"	19	Black tea, Rose Blend...	23837	W. R. Logan, Fredericton, N.B.	1	35	J. J. McGaffigan, St. John, N.B.	1·0129	5·64	Tea leaves, much broken and much dust.	"	23837
"	28	" Special Blend	23851	McKenzie & Flett, Campbellton, N.B.	. .		" " ..	1.0122	5·22	Tea leaves, broken ...	"	23851
		District of Quebec.										
"	6	.....	24618	J. E. Bourbieux, Tingwick, Que,	1	35	L. Chaput Fils et Cie, Montreal.	1·0126	6·26	Tea leaves, large . ..	Genuine....	24618
"	7	Japan green tea.....	24619	Louis Belisle, Racine..	1	35	Hudon & Orsalé, Montreal.	1·0135	6·04	Tea leaves, large, much broken.	" . . .	24619
"	8	Stroud's tea	24620	A. Oliver, Cowansville, ...	1	40	W. D. Stroud & Son, Montreal.	1·0142	4·64	Tea leaves, fairly large, much broken.	"	24620
"	8	Red Rose brand tea.....	24621	S. L. Guillet, Dunham.....	1	40	T. H. Esterbrooke, St. John, N.B.	1·0117	4·88	Tea leaves, large, broken	"	24621
"	8	Quakers' brand green tea	24622	Ormstead & Boright, Sutton, Que.	1	25	J. Matheson & Co., Montreal.	1·0130	4·88	Tea leaves, much broken	" . . .	24622
"	11	Salada tea, Black Ceylon	24623	A. Desjardins, St. Thérèsa, Terrebonne.	1	25	Laporte, Martin et Cie, Montreal.	1·0111	5·30	Tea leaves, large, broken	"	24623
"	11	Japan tea	24624	W. Sauvé, St. Scholastique..	1	40	Hudon, Hebert et Cie, Montreal.	1·0140	6·04	Tea leaves, large .	" . . .	24624
"	11	Ceylon green tea..... ..	24625	A. M. White, Grenville .	1	25	Cassils, Montreal	1·0127	6·04	Tea leaves, large, broken	"	24625
"	12	"	24626	G. J. Macintosh, Calumet...	1	25	W. D. Stroud & Son, Montreal.	1·0119	6·60	Tea leaves, large, much broken.	" . .	24626
"	13	Salada green tea	24627	F. A. Thompson et Cie, Buckingham.	1	25	Carter, Galbraith & Co., Montreal.	1·0124	4·86	Tea leaves, large, much broken.	"	24627
"	13	Black tea, Owl Chop brand.	24628	J. P. Lalaie, Buckingham..	1	25	L. Chaput fils et Cie, Montreal.	1·0125	5·36	Tea leaves, much broken and tea dust.	"	24628
"	14	Green Japan tea.. . .	24629	H. P. Charron, Hull..	1	30	.....	1·0124	6·94	Tea leaves and stems, large, broken.	"	24629
"	14	Green Japan Chester tea	24630	P. Daoust et Cie, Hull.	1	35	W. R. Stroud & Son, Montreal.	1·0134	6·16	Tea leaves, large .. .	"	24630
1904.		*District of Montreal.*										
April	4	Black tea.....	25101	V. Geoffrion, 1249 Ontario St.	1	30	Not given	1·0095	5·20	Tea leaves, large, broken.	Genuine....	25101
"	4	"	25102	L. Allaire, 1008 Ontario St...	1	20	"	1·0113	5·36	Tea leaves, large, broken.	" ...	25102
"	4	"	25103	A. Dubuc, 948 Ontario St....	1	25	Salada Tea Co....	1·0111	5·16	Tea leaves, large, broken.	"	25103
"	4	"	25104	T. Montpotis, 2587 Notre Dame.	1	25	Not given.....	1·0117	5·00	Tea leaves, broken ..	" ...	25104
"	1	Japan tea	25105	" "	1	25	"	1·0107	6·46	Tea leaves, large, broken.	" ..	25105

INSPECTION OF TEA.—Tabulated Statement—*Continued.*

Date of Collection.	Nature of Sample.	Number of Sample.	Name and Address of Vendor.	Cost.	Name and Address of Manufacturer or Furnisher as given by Vendor.	Result of Analysis.		Botanical Examination	Observations.	Number of Sample.
						Specific gravity of 10 p.c. extract.	Total ash.			
1904	*District of Montreal* Concluded.			Lb. Cts.		p.c.	p.c.			
April 4	Japan tea	25106	N. Chatrand, 340 Seigneurs St.	1 25	Not given	1·0105	6·90	Tea leaves, large, broken & many stems.	Genuine	25106
" 4	Black tea, Red Rose brand.	25107	" "	1 25	"	1·0113	5·24	Tea leaves, large & broken.	"	25107
" 5	Black tea.	25108	C. Campbell, 46 Cuthbert St.	1 25	Liptons	1·0127	5·30	Tea leaves, large, much broken.	"	25108
" 5	Green tea.	25109	J. C. A. Gratton, 870 St. Lawrence.	1 34	Not known	1·0107	5·96	Tea leaves, large, whole	"	25109
" 5	Black tea.	25110	P. P. Boileau, 635 St. Dominique St.	1 40	Not given	1·0122	5·20	Tea leaves, large, broken.	"	25110
" 5	Black tea, Tokao brand.	25111	W. Gratton, 345 St. Hypolite St.	1 30		1·0106	5·36	Tea leaves, large, broken.	"	25111
" 5	Black tea, Blue Ribbon brand.	25112	J. Buissiere, 771 Cadieux St.	1 25		1·0115	5·40	Tea leaves, very large, broken.	"	25112
	District of Kingston.									
" 26	Black tea	25160	W. J. Bovaird, King St., Prescott, Ont.	1 35	Not given	1·0140	5·36	Tea leaves, large, broken.	Genuine	25160
" 26	Japan tea.	25161	C. Whitney, King St., Prescott.	1 30	"	1·0125	6·24	Tea leaves, large	"	25161
" 27	Black tea, Red Rose brand.	25162	E. L. B. Cornell, Kemptville.	1 25	"	1·0136	1·81	Tea leaves, large, broken.	"	25162
" 27	Black tea.	25163	Larose & Co., Sussex St., Ottawa.	1 15	"	1·0117	5·30	Tea leaves large, much broken.	"	25163
" 27	Green tea.	25164	" "	1 20	"	1·0115	5·94	Tea leaves very large, broken.	"	25164
" 28	Black tea, Salada.	25165	Mrs. S. Lacasse, Perth St., Brockville.	1 25	Salada Tea Co.	1·0136	5·56	Tea leaves, large	"	25165

"	28	Green tea	25166	W. M. Veitch, Perth St., Brockville.	1	35	"	1·0129	6·06	Tea leaves, large	"		25166
		District of Toronto.											
"	12	Black tea	25182	J. A. Johnson, 775 Yonge St., Toronto.	1	25		1·0125	5·10	Tea leaves, large, broken.	"		25182
"	12	Japan tea	25183	W. Armstrong, 852 Yonge St., Toronto.	1	25		1·0127	6·46	Tea leaves, largh, much broken.	"		25183
"	12	Black tea	25184	Frank Giles, 822 Yonge St., Toronto.	1	30		1·0117	5·80	Tea leaves & stems	"		25184
"	12	Green tea	25185	Watson Bros., 756 Yonge St., Toronto.	1	30		1·0117	6·51	Tea leaves, much broken.	"		25185
"	12	Black tea	25186	David Bell, 702 Yonge St., Toronto.	1	35	Blended by Vendor	1·0122	5·24	Tea leaves & very many stems.	"		25186
"	12	"	25187	G. J. Melhuish, 601 Yonge St., Toronto.	1	10		1·0125	5·36	Tea leaves, broken	"		25187
"	14	Black tea	25188	J. B. Taylor, Welland, Ont	1	10		1·0119	5·16	Tea leaves, large, broken & many stems.	"		25188
"	14	Japan tea	25189	Geo. Stalker, Welland, Ont.	1	25		1·0138	5·70	Tea leaves, large, broken.	"		25189
		District of London.											
"	6	Indian tea	22212	Beck & Schell, Berlin	1	30	Not known	1·0121	5·64	Tea leaves, medium size, broken.	Genuine		22212
"	6	Blue Ribbon tea, green	22214	Edward Flaherty, Stratford, Ont.	½	20	G. F. J. Gault, Toronto	1·0121	4·70	Tea leaves, medium, broken.	"		22214
"	7	Ceylon tea	22216	Peter Dill, Seaforth	½	20	Thos. Lipton, London, Eng.	1·0116	5·36	Tea leaves, broken	"		22216
"	7	Japan tea	22217	John Beattie & Co., Seaforth.	½	14	Elliott Mar & Co., London.	1·0129	6·22	" "	"		22217
"	8	Salada tea	22221	George Lamotte, Strathroy	½	15	A. M. Smith & Co., London, Ont.	1·0129	4·62	Tea leaves and dust	"		22221
"	9	Red Rose Ceylon tea	22223	James Fraser, Sarnia, Ont	½	20	T. H. Esterbrooke, St. John, N.B.	1·0129	5·04	"	"		22223
"	12	Grand Mogul Ceylon tea	22227	Fred Dulton, Ingersoll	½	20	T. B. Escott & Co., London, Ont.	1·0130	5·00	Tea leaves, large, broken.	"		22227
		District of Winnipeg.											
"	20	Tea	23935	Gustafson & Co., Winnipeg	1	25		1·0150	5·80	Tea leaves, large and stems.	Genuine		23935
"	20	"	23937	Prentice & Young, Winnipeg.	1	25		1·0132	5·58	" "	"		23937
"	20	"	23939	J. O. Hare, Winnipeg	1	25		1·0132	4·96	Tea leaves, large	"		23939
"	20	"	23942	S. Elliott, Winnipeg	1	25		1·0132	5·56	Tea leaves, large, broken and stems.	"		23942
		District of Calgary.											
"	20	Tea	21783	L. B. Cochran, Calgary	1	50	Codville & Co., Winnipeg.	1·0117	5·82	Tea leaves, large	Genuine		21783

INSPECTION OF TEA—Tabulated Statement—*Concluded.*

Date of Collection.	Nature of Sample.	Number of Sample.	Name and Address of Vendor.	Cost.	Name and Address of Manufacturer or Furnisher as given by Vendor.	Result of Analysis.		Botanical Examination	Observations.	Number of Sample.
						Specific gravity of 10 p.c. extract.	Total ash.			
1904.	*District of Calgary*—Con.			Lb. Cts.		p.c.	p.c.			
April 20	Tea	21785	J. Kennedy & Co., Calgary	1 50	Codville & Co., Winnipeg.	1·0113	5·22	Tea leaves, small, some dust.	Genuine	21785
	District of British Columbia.									
" 13	Tea	24936	Blair & Hadden, Cloverdale, B.C.	1 35	T. S. Annandale, New Westminster.	1·0115	5·56	Tea leaves, large, broken and many stems.	"	24936
" 21	"	24945	Phil. Oven Settlers' Store, South Vancouver.	1 40	W. J. McMillan & Co., Vancouver.	1·0121	5·40	Tea leaves, large	"	24945
" 21	"	24946	A. E. Buchanan, Central Park, W. Vancouver	1 35	Baker, Luson & Co., Vancouver.	1·0121	5·46	Tea leaves, large, broken.	"	24946
" 22	"	24947	D. Woodward, Sapperton, B.C.	1 35	T. S. Annandale, New Westminster.	1·0115	5·84	Tea leaven, large, broken and many stems.	"	24947
" 22	"	24949	Barnett Saw-mill Store	1 25	Unknown	1·0109	6·06	Tea leaves, large and broked.	"	24949
" 22	"	24953	C. Boardman, Vancouver	½ 40	"	1·0109	5·46	Tea leaves, large, broken and stems.	"	24953

APPENDIX N.

BULLETIN No. 100—GROUND COFFEE.

OTTAWA, August 3, 1904.

W. J. GERALD, Esq.,
Deputy Minister of Inland Revenue.

SIR,—I submit herewith a tabulated statement showing the results obtained by Mr. A. McGill, M.A., &c., in examining 75 samples of ground coffee, the collection of which was authorized in your letter of 14th January last. In which collection districts these samples were obtained, and the numbers of them found genuine or otherwise will be seen from the following statement:—

Collection District.	Genuine.	Adulterated.	Doubtful.	Adulteration declared.	Total.
Halifax	3	4	0	0	8
Prince Edward Island	1	0	1	0	2
New Brunswick	5	0	1	0	6
Quebec	10	0	3	0	13
Montreal	6	4	1	1	12
Kingston	5	2	0	0	7
Toronto	3	2	2	1	8
London	6	1	0	0	7
Winnipeg	3	1	0	0	4
Calgary	2	0	0	0	2
British Columbia	1	5	0	0	6
	45	19	8	3	75

I have the honour to be, sir,

Your obedient servant.

THOMAS MACFARLANE,
Chief Analyst.

Date of Collection.	Nature of Sample.	Number of Sample.	Name and Address of Vendor.	Cost. Quantity.	Cost. Price.
1904.	*Halifax District.*			Lbs.	$ cts.
Jan. 27..	Coffee	20421	D. Wood, Windsor	1	0 30
" 27..	"	20425	Murphy & DeMont, Windsor, N.S.		
" 27..	"Peerless Brand"	20433	Brown & Graham, Halifax, N.S.		
" 27..	Royal Java	20435	R. T. Forristall, Halifax, N.S.		0 40
" 27..	"Seal"	20436	R. Urquhart & Son, Halifax		0 40
" 27..		20437	W. J. Hopgood, Halifax		35
27..		20441	Burgess & Quinn, Halifax, N.S.		0 35
" 27..	"Peerless"	20443	H. W. Wentzell & Co., Halifax, N.S.		
	Prince Edward Island District.				
Jan. 26..	Coffee	24403	Geo. Packham, Charlottetown	1	0 32
" 27 .	"	24404	Brace & McKay, Summerside		0 40
	New Brunswick District.				
" 25..	Ground coffee	23809	Maritime Spice & Coffee, Ltd., St. John.	3 half lb. tins.	0 60
" 25..	"	23810	James Moulson, 53 Sydney St., St. John.	3 half lbs. bulk	0 60
" 28 .	Cowan's Famous Blend	23815	Gross & Dawson, Main St., Moncton.	1 lb.	0 35
" 28..	Standard and Imperial Blend	23816	T. & F. Dobson, Main St., Moncton.	1	0 40
Feb. 4..	"Java" in bulk	23819	Inches & Grimmer, Water St., St. Stephen.		
" 5..	Ground coffee	23822	Halt, Morrison & Co., Ltd., cor. Queen and York St., Fredericton		36
	Quebec District.				
Jan. 25..	Pure Mocha	23650	Maison Labonté, Terrebonne	1	0 35
" 26	Coffee	23652	J. G. Chevalier, Joliette	1	0 40
" 26..	"	23654	J. J. Soumis, Joliette	1	0 40
" 27..	Java coffee	23657	J. O. Daviault, Berthierville	1	0 40
" 28.	Coffee	23662	Thos. Bournival, Trois Rivières	1	0 40
" 28..	"Ubero"	23666	L. A. Ricard, Trois Rivières	1	0 40
" 29..	Coffee	23669	L. Gingras, 304 Richelieu St., Que.		0 40
" 29..	"	23671	S. Hamel, 106 D'Aiguillon St.		0 40
" 30..	"	23674	Mrs. F. Coveny, 2 St. Patrick St., Que.		0 35
" 30..	"	23676	H. G. Kell, 80 St. Augustine		0 35

SESSIONAL PAPER No. 14

COFFEE—Tabulated Statement.

Microscopic Examination.	Sp. Gravity of 10 p.c. extract.	Iodine reaction for Starch.	Observations.
Coffee and roasted cereals	1·0113	Blue	Adulterated.
" tissues only	1·0083	None	Genuine.
" and roasted cereals	1·0126	Blue	Adulterated.
" tissues only	1·0083	None	Genuine.
" "	1·0085	"	"
" and chicory tissues	1·0099	"	Contains a small quantity of chicory ; about 5 p.c. Sold as containing 2 oz. chicory per lb.
" and roasted cereals	1·0149	Blue	Adulterated.
" "	1·0130	"	"
Coffee tissues ; a little chicory	1·0115	None	Contains about 5 p.c. of chicory.
Coffee tissues only	1·0089	"	Genuine.
Coffee tissues only	1·0093	None	Genuine.
" "	1·0089	"	"
" tissues with a trace of chicory	1·0093	"	Contains a trace of chicory less than 5 p.c.
" tissues only	1·0091	"	Genuine.
" "	1·0089	"	"
" "	1·0087	"	"
Coffee tissues only	1·0093	None	"
" "	1·0091	"	"
" "	1·0081	"	"
" "	1·0087	"	"
" "	1·0091	"	"
" "	1·0088	"	"
" "	1·0084	"	"
" "	1·0090	"	"
" "	1·0081	"	"
" and chicory tissues	1·0103	"	Contains about 5 p.c. of chicory

Date of Collection.	Nature of Sample.	Number of Sample.	Name and Address of Vendor.	Cost. Quality.	Cost. Price.
1904.	*Quebec District*— Concluded.			Lb.	cts.
Feb. 4.	Java Coffee	23681	John Maison, Drummondville.		0 40
" 4.	"	23682	T. A. Bourgault, Drummondville.		0 40
" 5.	"	23686	Prosper Dussault, St. Hyacinthe.		0 40
	Montreal District.				
Jan. 20.	Coffee	21485	A. Fournier, 1789 St. Catherine street.	1	0 40
" 20.	"	21486	C. E. Authier, 1758 St. Catherine street.	1	0 40
" 20.	"	21487	A. Mercier, 498 Dorchester street.	1	0 40
" 20.	"	21488	L. G. Thouin, 487 Lagauchetiere street.	1	0 40
" 21.	"	21489	M. F. Lafortune, 116 St. Maurice street.	1	0 40
" 21.	"	21490	Pilon & Meilleur, 114 St. Maurice street.	1	0 30
" 21.	"	21491	A. Lamy, 2021 Notre Dame street.	1	0 25
" 21.	"	21492	A. Lamy, 2021 Notre Dame street.	1	0 30
" 21.	"	21493	J. Deneau, 53 Juror st	1	0 40
" 22.	"	21494	A. Massicotte & Co., 1472 St. Catherine street.	1	0 25
" 22.	"	21495	T. Bergeron, 1522 St. Catherine street.	1	0 35
" 22.	"	21496	C. Coderre, 1358 Notre Dame street.	1	0 40
	Kingston District.				
" 28.	Coffee	25001	Peter Glavey, 37 York street, Ottawa.	1	0 35
" 28.	"	25002	H. O. Richer, 31 York street, Ottawa.	1	0 35
" 28.	"	25003	P. L. Foisy, 297 Dalhousie, street, Ottawa.	1	0 40
" 28.	"	25004	Wm. Rhodes, King st., Brockville.	1	0 40
" 28.	"	25005	Tompkins & Co., Brockville.	1	0 35
Feb. 1.	"	25006	Jas. Redden, Princess st., Kingston.	1	0 40
" 1.	"	25007	W. R. McRae Bros., Kingston.	1	0 30
	Toronto District.				
" 2.	Coffee	25022	J. Bond, 559 Queen W., Toronto.	1	0 40
" 2.	"	25023	C. Janatta & Co., 400 Queen W., Toronto.	1	0 25
" 2.	"	25024	C. Janatta & Co., 400 Queen W., Toronto.	1	0 35
" 2.	"	25025	J. Summer, 306 Queen W., Toronto.	1	0 40

COFFEE—Tabulated Statement—*Continued.*

Result of Analysis.			
Microscopic Examination.	Sp. Gravity of 10 extract.	Iodine reaction.	Observations.
Coffee tissues only	1·0087	None	Genuine.
" and chicory tissues	1·0105	"	Contains about 5 p.c. of chicory.
" "	1·0125	"	Contains about 10 p.c. of chicory.
" tissues only	1·0087	None	Genuine.
"	1·0090	"	"
Coffee and a trace of roasted cereals.	1·0083	Faint blue	Doubtful.
Coffee tissues and roasted grain	1·0130	Blue	Adulterated.
Coffee and chicory tissues	1·0149	None	Adulterated with chicory, about 15 to 20 per cent.
Coffee and cereals	1·0079	Blue	Contains roasted grain.
Coffee and chicory tissues	1·0153	None	Adulterated with chicory, about 20 per cent.
Coffee tissues only	1·0089	"	Genuine.
"	1·0088	"	"
Coffee and chicory tissues	1·0120	"	Sold as containing chicory. Contains about 10 per cent.
Coffee tissues only	1·0088	"	Genuine.
"	1·0080	"	"
Coffee and chicory tissues	1·0124	"	Adulterated with chicory, about 10 to 15 per cent.
Coffee tissues only	1·0089	"	Genuine.
"	1·0085	"	"
"	1·0076	"	"
"	1·0090	"	"
"	1·0083	"	"
Coffee and chicory tissues	1·0128	"	Contains about 10 to 15 per cent chicory.
Coffee and chicory tissues	1·0115	None	Sold as containing a small amount of chicory. Contains about 10 per cent.
Coffee, chicory and roasted cereals	1·0195	Blue	Adulterated.
Coffee and chicory tissues	1·0105	None	Contains a little chicory, about 5 per cent.
Coffee, with a little chicory	1·0117	"	Adulterated with 5 to 10 per cent chicory.

Date of Collection.	Nature of Sample.	Number of Sample.	Name and Address of Vendor.	Cost. Quantity.	Cost. Price.
1904.	*Toronto District*—Concluded.			Lbs.	$ cts.
Jan. 3.	Coffee.	25026	D. Sutherland, 295 King E., Hamilton.	1	0 40
" 3.	"	25027	C. Lee, 101 King E., Hamilton.	1	0 25
" 3.	"	25028	J. H. Horning, 92 John street, Hamilton.	1	0 25
" 3.	"	25029	F. H. Blain, 87 John st., Hamilton.	1	0 35
	London District.				
" 23.	Aroma coffee.	22187	Charles Andrews, Seaforth	1	0 40
" 27.	Mocha coffee.	22189	Joseph Baxter, Stratford.	1	0 40
" 28.	Coffee	22191	Beck & Schell, Berlin.	1	0 15
" 28.	"	22193	A. J. Fitzsimmons, Guelph.	1	0 15
" 29.	"	22200	James Patterson & Co., Fergus, Ont.	1	0 28
Feb. 6.	"	22201	Peter Dill, Seaforth.	1	0 40
" 6.	"	22204	Charles A. Nairn, Goderich.	1	0 40
	Winnipeg District.				
" 9.	Coffee	23923	W. Dowling & Co., Brandon.	¾	0 25
" 10.	"	23926	A. Grant, Brandon.	¾	0 25
" 10.	"	23927	McLellan & English, Virden.	¾	0 35
" 12.	"	23931	W. W. Stone, Winnipeg.	¾	0 30
	Calgary District.				
" 10.	Ground coffee	21779	A. H. Richards & Co., Strathcona.	1	0 35
" 11.	"	21781	Monroe & Whitcomb, Edmonton.	1	0 25
	British Columbia District.				
" 2.	Coffee	24918	H. Duff, Vancouver.	1	0 25
" 2.	"	24919	E. Clayton, Vancouver.	1	0 25
" 2.	"	24920	W. Seidelman, Vancouver	1	0 25
" 2.	"	24924	McCulloch Bros., Vancouver.	1	0 25
" 2.	"	24929	A. DesBrisay, Vancouver.	1	0 25
" 2.	"	24935	C. M. Tanner, Vancouver.	1	0 20

SESSIONAL PAPER No. 14

COFFEE—Tabulated Statement—*Concluded.*

Results of Analysis.

Microscopic Examination.	Sp. Gravity of 10° extract.	Iodine reaction for Starch.	Observations.
Coffee tissues only	1·0097	None	Genuine.
Coffee and chicory tissues	1·0109	"	Contains about 5 per cent of chicory.
Coffee tissues only	1·0090	"	Genuine.
"	1·0082	"	"
Coffee tissues only	1·0089	"	Genuine.
"	1·0089	"	"
"	1·0089	"	"
"	1·0084	"	"
Coffee, chicory and roasted grains	1·0229	Blue	Adulterated.
Coffee tissues only	1·0091	None	Genuine.
"	1·0091	"	"
Coffee tissues only	1·0090	None	Genuine.
Coffee and chicory tissues	1·0140	"	Adulterated with chicory, about 15 to 20 per cent.
Coffee tissues only	1·0095	"	Genuine.
"	1·0096	"	"
			Is a whole coffee.
Coffee tissues only	1·0087	None	Genuine.
Coffee tissues and roasted cereals	1·0123	Blue	Adulterated.
" "	1·0117	"	"
Coffee, chicory and roasted cereals	1·0181	"	"
Coffee and roasted grain	1·0123	"	"
" "	1·0125	"	"
Coffee tissues only	1·0091	None	Genuine.

REPORT

OF THE

MINISTER OF AGRICULTURE

FOR THE

DOMINION OF CANADA

FOR THE

YEAR ENDED OCTOBER 31

1904

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
PRINTED BY S. E. DAWSON, PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1905

No. 15—1905.]

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MINISTER'S REPORT:—

REPORT

OF THE

MINISTER OF AGRICULTURE

1904

To His Excellency the Right Honourable Sir ALBERT HENRY GEORGE, EARL GREY, *Viscount Howick, Baron Grey of Howick, in the County of Northumberland, in the Peerage of the United Kingdom, and a Baronet; Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, &c., &c., Governor General of Canada.*

MAY IT PLEASE YOUR EXCELLENCY—

I have the honour to submit to Your Excellency the annual report of the Department of Agriculture, for the year ended October 31, 1904.

I.—GENERAL REMARKS.

A synopsis of the work of the department and of the operations of the various branches comprised therein is laid before Your Excellency. The work in each has been efficiently carried out.

The legislation affecting the department during the last session of Parliament consisted of Chapter 6, 4 Edward VII., intituled 'An Act to amend the Animal Contagious Diseases Act, 1903.'

This action was taken for the following purposes:—

To add to the list of infectious or contagious diseases mentioned in sub-section *e* of section 2 of 'The Animal Contagious Diseases Act, 1903,' the disease of Maladie du Coit;

To grant compensation for animals slaughtered owing to their being affected or in contact with infectious or contagious diseases, and

To limit the valuation per head of grade animals and pure bred animals so slaughtered.

By Proclamation under date the 8th January, 1904, the port of Louisburg, N.S., was declared a Quarantine Station. Vide *Canada Gazette,* vol. xxxvii, page 1254.

By Order in Council approved by Your Excellency under date the 23rd February, 1904, revised and amended Rules and Forms of the Canadian Patent Office were established. Vide *Canada Gazette,* vol. xxxvii, page 1798.

By Order in Council approved by Your Excellency under date the 30th March last, in virtue of the provisions of 'The Animal Contagious Diseases Act', the Order in Council dated the 25th January, 1897, establishing regulations relating to Animals' Quarantine and Health of Animals was rescinded and new regulations substituted therefore. Vide *Canada Gazette,* vol. xxxvii, page 1967.

By Order in Council approved by Your Excellency under date the 30th March last, under the provision of section 5 of 'The San José Scale Act' the Order in Council of the 15th January, 1903, was amended. Vide *Canada Gazette,* vol. xxxvii, page 1970.

By Order in Council approved by Your Excellency under date 27th June last, in virtue of the provisions of Section 29 of 'The Animal Contagious Diseases Act', regulations were established relating to the disease of Mange in animals in the Dominion.

By Order in Council approved by Your Excellency under date the 8th July, 1904, in virtue of the provisions of Section 29 of 'The Animal Contagious Diseases Act', regulations were established relating to the disease of Maladie du Coit in animals.

By Order in Council approved by Your Excellency under date the 13th August, 1904, a change was made in the site of the Cattle Quarantine Reservation west of the 3rd Meridian, in the North-west Territories. Vide *Canada Gazette,* vol. xxxviii, page 469.

By Orders in Council under date the 19th September, 1904, in virtue of the provisions of Section 29 of 'The Animal Contagious Diseases Act', regulations were established authorizing the payment of compensation for animals slaughtered owing to the diseases of Maladie du Coit and glanders. Vide *Canada Gazette,* vol. xxxviii, page 624.

By Order in Council approved by Your Excellency under date the 19th September, 1904, under the provisions of Section 5 of 'The San José Scale Act', the Order in Council of the 5th January, 1901, was amended. Vide *Canada Gazette,* vol. xxxviii, page 574.

This year has been marked by our participation in the World's Fair known as the Louisiana Purchase Exposition, being held at St. Louis, in the United States, opening on May 1 last, and closing on December 1 next.

Our hopes of advantage to Canada through taking part in this exhibition have been fully justified. The decision to participate was come to because it was believed that we could thereby attract the attention of the agricultural and industrial classes of the great Mississippi valley to our Dominion as a field for emigration. To this end we have attempted to make an attractive and instructive display of our agricultural wealth especially, to prove that Canada was not an inhospitable country. We have

also attempted to show the mineral wealth of the country in such a way as to attract the attention of capitalists interested in mining. In both these attempts we have succeeded in a marked degree.

When the exhibition opened, I am happy to say that Canada's preparations were the most forward of any of the foreign exhibitors, and we were able to immediately attract the attention of visitors.

The exhibition was so organized that we were obliged to show our agricultural exhibits in the agricultural building, our horticultural exhibits in the horticultural building, our mineral exhibits in the mining and mineralogical building, and our forestry and game exhibits in the building devoted to those classes.

For convenience of management and for giving information to the visitors we found it necessary to have also a Canadian pavilion, where our officers could meet the public and have a supply of literature and information at hand. The exhibition authorities yielded to our insistence and gave us a site for this building in a most favourable locality, where those specially interested in agriculture and the public at large have found it easy to visit our building. This concession was a great advantage, as the other foreign pavilions and the various state buildings were not so well placed as ours.

Each and every one of our various exhibits is most successful, and reflects great credit on my chief commissioner, Mr. Hutchison, and the officers under him who collected them and installed them.

The agricultural, horticultural, and forestry and game exhibits are managed very much on the lines of the same classes of exhibits on other occasions, except that they are even more conspicuous and successful, but in the mineral exhibit we have adopted a new course. In addition to having what I might call good geological specimens of all the mineral productions of the country, arranged scientifically, we have endeavoured to make a striking display of certain mineral products for which the world is largely dependent on Canada, and of which we have an abundant commercial supply. These are presented in striking quantities and in a manner to attract special attention. Our gold exhibit is arranged so as to be most effective, especially from the fact that we have really tens of thousands of dollars' worth of the precious metal actually on exhibition, while the other supposed exhibits of gold in the building were nearly, if not all, imitation. This struck the imagination and impressed the visitors very much. The exhibits of asbestos, mica, nickel and corundum were all most attractive and most effective. An immense pyramid of solid specimens of cobalt-silver-arsenic ore also attracted great attention from both scientific geologists and the practical miner, as this ore had never before been seen in large specimens.

The general arrangement of the mineral exhibit, with the striking specimens in regard to Canada's production of certain of these in commercial quantities, is most effective, and compliments are being freely paid by both scientists and practical mining men as well as officers of the United States and other governments who are themselves actively engaged with the exhibits of those countries. Without making any in-

vidious distinction I venture to say that no mineral display superior to this has ever been made at a world's fair.

The other exhibits of Canada are all most excellent. Our agricultural products, with labels on them showing truthfully that they were grown in some instances as much as two thousand miles north of St. Louis, astonished the visitors. The horticultural display of most excellent fruits of all kinds not tropical or semitropical also show the attractiveness of our country for settlement and immensely impressed the visitors, especially those from the southern parts of the United States, who had always been told that Canada was an arctic region. Our display of furs and fur-bearing animals, with the exhibit of live beavers, is a constant attraction to every body and causes many inquiries amongst sportsmen as to the possibilities of a visit to Canada.

When the visitor is thus attracted by the exhibits he is easily led to a visit to the Canadian pavilion, and there the genial courtesy of our commissioner and staff, and the constant willingness to give all information about Canada, surprise and please him. The Canadian building is constantly crowded by the visitors, eagerly asking questions and demanding pamphlets and documents which they could read at their leisure. The building itself is full of illustrations of Canadian life, and the Canadian country, a most telling object lesson to the visitors. On the walls are to be seen a series of really artistic paintings depicting the development of prairie homes, from the first breaking of the sod to the later comfortable homestead, sheltered by trees and surrounded by stock. These are reproductions of scenes actually in existence in the North-west, and are in themselves an education and an incitement to the intending emigrant.

Officers of the Immigration Department are on hand to give all information about the laws and regulations for immigrants, and an immense mass of literature of all kinds is available to those inquiring. Notwithstanding the abundant supply, however, the demand is so far beyond expectation that care and discrimination has now to be exercised in giving it out, and absolutely nothing of this kind will be left at the close.

I venture to say that no such striking or successful advertisement of Canada's resources and Canada's possibilities as a home for settlers has ever been made, and all reports indicate that the results from this work are and will be quite commensurate with the expenditure.

The expenditure is considerable because of the difficulties of securing labour in St. Louis. It was found more economical and we were able to get more rapidly along with our work by doing a great deal of it in Ottawa and forwarding even the stands for the exhibits to St. Louis. Even with this, however, the expenses have been larger than we estimated, but I am satisfied that the results will be in even a greater degree larger than we at all anticipated when the work was begun.

As the exhibition does not close until December 1, the full report of the commissioner will be presented at the close of the exhibition, and appear in an appendix to my annual report of next year.

We have received during the year invitations to participate in the Lewis & Clark World's Fair, at Portland, Oregon, to open on June 1, 1905; and in the Universal Exposition to be held at Liege, Belgium, opening on April 20, 1905. The invitation to participate in the Liege Exhibition has been accepted. A site in this exhibition for a Canadian building is under consideration, and I am confident that we will be able to make a successful and valuable exhibit in this most important exhibition of next year.

I have noted that various trade exhibitions are annually held in the Royal Agricultural Hall, Islington, London; and have studied them with a view of using them to advantage for the advertising of our food products in Great Britain. Getting necessary information in connection therewith, I last summer decided to send an exhibit to three of these: the Confectioners', Bakers' and Allied Traders' Exhibition; the Grocers' and Allied Traders' Exhibition, and the Dairy Products Exhibition, which were held one after another in the months of September and October. I am very much pleased to find that my anticipations of the usefulness of these exhibitions were fully justified. We were able to secure the same space and use the same decorations for all three; changing the character of the exhibits according to the nature of the exhibition. The reports from all sources as to the results are very satisfactory. These exhibitions are attended by those engaged in the trade, as well as the public at large. Our participation in them has been commented upon by the trade journals with emphatic praise of our exhibits and compliments on this new departure in our work. Already the results are apparent; many dealers in London who never before handled Canadian products now carrying them as a regular portion of their stock. This effort has been so successful that I am sure it is one of the best means for advertising our food products in this unlimited market, and we have the additional advantage of securing a very great result at a comparatively small cost.

The report of those in charge of these exhibits at Islington will be found as an appendix to this report.

The climatic and other conditions necessary for the successful culture of tobacco being similar in Wisconsin to those existing in Canada, and particularly in the province of Quebec, and that State having developed a very large and profitable export trade in tobacco, it was deemend expedient, with a view to developing a like trade in Canadian tobacco, to send experts from Canada to Wisconsin to examine and inquire into the methods of planting, cultivating, growing and preparing tobacco, employed in that State. Two such experts were, in the spring, and again in the autumn, of this year, sent to Wisconsin, where they observed and made notes upon the methods employed there of preparing the soil and plant beds, of transplanting, of cultivating, of harvesting, of curing, and of packing the tobacco; and upon their return to Canada they visited the tobacco growers in several counties and gave them information of value in regard to the Wisconsin tobacco growers' methods. These experts have made a report to me upon their visits to Wisconsin; and it is my intention to impart, during the coming winter, by lectures or otherwise, to the tobacco growers of the Dominion, the information contained in that report.

II.—ARTS AND AGRICULTURE.

BRANCH OF THE COMMISSIONER OF AGRICULTURE AND DAIRYING.

The work of this branch will be more fully dealt with in the report of the Commissioner of Agriculture and Dairying which is being prepared for a separate volume.

The organization continues to be the same as given in my last report.

The Commissioner of Agriculture and Dairying, with the officers under him, is engaged in promoting the general improvement of farm products, including live stock, seeds, butter, cheese, poultry and fruit; in facilitating the transportation of perishable articles ; in securing information regarding defects in the quality of Canadian produce, or in the methods of packing ; in studying the requirements of our various markets, and in disseminating such knowledge as will enable the producers to improve their products and extend the trade therein. The work is largely of a technical nature.

This branch differs from the Experimental Farms Branch by dealing principally with the commercial side of farming industries. It does not, to any extent, carry on experiments or scientific investigations.

The export trade of the country in most of its farm products continues to increase as shown by the following tables :—

VALUE OF SOME CANADIAN FARM PRODUCTS EXPORTED FROM 1896 TO 1904.

(Years ending June 30th.)

——	1896.	1897.	1898.	1899.	1900.	1901.	1902.	1903.	1904.
	$	$	$	$	$	$	$	$	$
Wheat	5,771,521	5,544,197	17,313,916	7,784,487	11,995,488	6,871,939	18,688,092	24,566,703	13,465,351
Flour	718,433	1,540,851	5,425,760	3,105,288	2,791,885	4,015,226	3,968,850	4,699,143	6,129,226
Oats	273,861	1,655,130	3,011,578	3,268,388	2,143,179	2,490,521	2,052,559	2,583,151	1,603,104
Oatmeal	364,655	462,949	554,757	396,568	474,991	457,807	344,352	537,002	756,687
Pease	1,299,491	2,352,891	1,813,792	1,955,598	2,145,471	2,674,712	1,805,718	1,052,743	1,133,268
Barley	316,028	566,505	158,978	110,040	1,010,425	1,123,055	231,199	457,233	489,437
Hay	1,976,431	999,238	357,844	411,631	1,414,109	2,097,882	4,413,411	3,595,665	1,897,730
Cattle	7,082,542	7,159,388	8,723,292	8,522 835	9,080,776	9,064,562	10,663,819	11,342,632	10,424,671
Sheep and lambs	2,151,283	1,002,011	1,272,077	1,540,857	1,894,012	1,625,702	1,483,526	1,655,681	1,545,117
Cheese	13,956,571	14,676,239	17,572,763	16,776,765	19,856,324	20,696,951	19,686,291	24,712,943	24,184,566
Butter	1,052,089	2,089,173	2,046,686	3,700,873	5,122,156	3,295,663	5,660,541	6,954,618	4,724,155
Pork, bacon and hams	4,446,884	5,871,988	8,092,930	10,473,211	12,803,034	11,829,820	12,457,863	16,029,269	13,468,768
*Poultry	18,992	56,792	97,473	139,759	210,822	141,518	238,047	160,518	140,214
Eggs	807,086	978,479	1,255,304	1,267,063	1,457,902	1,691,640	1,733,242	1,436,130	1,053,396
†Fruits	1,716,278	2,987,839	1,709,360	3,596,415	3,305,662	2,006,235	1,922,304	3,689,662	5,475,535
Totals	41,952,145	47,943,670	69,436,510	63,049,778	75,706,236	70,093.233	85,349,794	103,473,093	86,491,225

* Dressed and undressed.
† Including green, dried, canned and preserved.

There has been a much larger increase in the production of these products than is indicated in the preceding table. The increase in population and the greater prosperity of the people generally, have added to the home consumption enormously.

DAIRY DIVISION.

COOL CHEESE CURING ROOMS.

The cool cheese curing-rooms at Woodstock, Brockville, Cowansville and St. Hyacinthe, for which I asked an appropriation from Parliament in 1902, have now been in operation for three seasons. During this period 119,805 boxes of cheese have been cured at these establishments, being a sufficient quantity to make an impression on the market and to attract considerable attention. I am informed that during the past season cool cured cheese have been sold at an advance of $\frac{1}{8}$ to $\frac{1}{4}$ of a cent per pound above the highest price obtained at the same cheese boards for ordinary cured cheese. The difference in price will be greater when the superior qualities of cool cured cheese are better known.

Several lots of cheese from the cool curing-rooms were recently consigned to merchants in Great Britain with a view of getting a report on the quality of the cool cured cheese as compared with others of the same batch cured at ordinary temperatures.

The merchants who received the cheese had them examined by members of the trade in their various localities. The report on one lot was as follows :—

'(*a.*) Cool curing during the summer months is a decided improvement over the ordinary method and improves the quality of the cheese not less than 2s. and in some cases 4s. per cwt.

'(*b.*) Paraffining in some cases is an improvement when properly applied on well-made, close-textured cheese ; but does harm on mushy, soft and acidy cheese.'

Messrs. Andrew Clement & Sons, Glasgow, who forwarded this report, wrote as follows :—

'We thoroughly agree with the above report, and indeed are so much impressed with the benefits of cool curing that if practicable we should like to see it made compulsory throughout Canada, believing that the universal adoption of such an improvement would be an enormous factor in increasing the consumption of cheese and consequently benefiting the whole dairying industry of Canada.'

The cool cured lot of the foregoing consignment sold at 40 shillings, and the ordinary cured ones at 38 shillings per cwt., a difference of nearly $\frac{1}{2}$ a cent per pound.

Apart from the improvement in quality there is a decided gain by the saving of shrinkage when the cheese are cool cured. The curing-rooms were in operation from the 1st of July to the end of September in 1902, and from the 18th of May to the end of September in 1903 and 1904. The average saving of shrinkage for this period has

been over one pound per cheese. It is reported to me that a large number of cheese factory curing-rooms have already been improved along the lines illustrated by the Government Curing-Rooms, and a great many inquiries are received by officers of the department for information concerning such work.

I have authorized the improvement of several cheese factory curing-rooms in districts remote from the centres where the four government curing-rooms are located.

OFFICIAL REFEREE FOR BUTTER AND CHEESE AT MONTREAL.

During the season of 1904 the official referee for butter and cheese at Montreal has been called in to examine 923 lots of cheese and 287 lots of butter over which there were disputes as to quality between the buyer and seller. Of this number he pronounced 34 lots of cheese and 11 lots of butter as being of 'finest' quality, and his decision was accepted as final.

The officer who fills this position is also in charge of the inspectors of the extension of markets division, who are employed watching the arrival of the refrigerator cars and the loading of perishable products on steamships.

NORTH-WEST TERRITORIES CREAMERIES.

Creameries were operated during the season of 1904 at the following places : Edmonton, Wetaskiwin, (part of the season), Lacombe, Blackfalds, Red Deer, Innisfail, Tindastoll, Olds, Calgary, Qu'Appelle, Moosomin, Churchbridge and Saltcoats.

Full returns are not yet available for the season of 1904.

MARKETS FOR THE OUTPUT OF WESTERN CREAMERIES.

British Columbia has always been considered the principal market for the product of the North-west Territories creameries, but during the seasons of 1899 and 1900 some difficulty was experienced in disposing of all the butter at satisfactory prices. In both 1901 and 1902 it was found necessary to ship several carloads to Montreal for export to Great Britain. The returns from these shipments after deducting freight, &c., were rather low and disappointing.

There has been a good market in the Yukon for a considerable quantity of specially packed, first-class butter, but this trade went to the United States for several years because certain Canadian dealers filled their orders, when the country was first opened, with a very inferior article. The reputation of Canadian butter became so bad in consequence that it was found impossible to make any sales for Yukon shipment, except what was supplied to the North-west Mounted Police, until the season of 1903, when orders were secured for 90,000 pounds. The shipments have been doubled during the past season, and the assurance is given that if the quality and style of packing are maintained up to the standard of the past two seasons' supply there will be no difficulty in securing the whole of the trade, which amounts to over

half a million pounds annually. The butter for the Yukon trade is mostly put up in tins, and must be first-class in every particular, and packed in strong cases to stand the exceedingly heavy handling which it must undergo during the several transhipments.

SHIPMENTS TO THE ORIENT.

For several years past a small quantity of butter has been sold annually from the North-west creameries for shipment to the Orient, but during 1903 and 1904, (since the Osaka Exhibition), these shipments have been increased in amount over ten times, and our customers inform us that when the war is over we may look for further increases in their orders. The bulk of the oriental shipments goes to Japan, and while the total importation of butter into Japan is not large, it is claimed that the demand is likely to grow very considerably in the future.

NOVA SCOTIA CREAMERIES.

The department still operates the dairy station at Nappan, and a creamery at Scotsburn and one at Mabou. The severe drought which prevailed last summer in the localities where these creameries are situated operated against their success by cutting off the supply of milk to a considerable extent.

COW CENSUS.

A 'cow census,' so called, is being conducted in the counties of Shefford, Brome and Missisquoi, with Cowansville as a centre. Seventy-two farmers agreed to take a sample of each cow's milk, morning and evening, on three days every month, at the same time weighing the total yield of those six milkings. A box containing as many sample bottles as there are cows in the herd is sent to the farm, and when the samples for the month are all taken, it is returned to the government cheese curing-room at Cowansville, where the samples are tested. From this, and other data to be collected, a fair estimate of the actual yield of each cow will be secured. A great deal of interest has been taken in this work, which has for its object the improvement of dairy herds in the country, by encouraging the owners to weed out the unprofitable cows. The results so far obtained show an astonishing variation in the productiveness of different cows of the same breed and in the same herd.

EXPORTS OF BUTTER AND CHEESE.

The magnitude and growth of the export trade of Canada in dairy products is shown by the following tables (years ended June 30):—

SESSIONAL PAPER No. 15

DOMINION OF CANADA—Exports of Dairy Products—Home Production.

BUTTER.

Year.	Quantity.	Value.	To Great Britain.	To United States.	To France.	To Germany.	Other Foreign Countries.	B. N. A. Provinces	British Indies.
	Lbs.	$	$	$	$	$	$	$	$
1869	10,649,733	1,698,042	534,707	1,015,702	.....	1,496	14,870	95,777	26,986
1880	18,535,362	3,058,069	2,756,064	111,158	.....	.....	24,710	163,290	2,647
1890	1,951,585	340,131	184,105	5,059	.....	.....	29,342	119,989	1,636
1891	3,768,101	602,175	440,060	10,054	.....	20,447	24,021	101,649	5,944
1892	5,736,696	1,056,058	877,455	6,038	.....	5,160	27,207	133,770	6,428
1893	7,036,013	1,296,814	1,118,614	7,539	.....	1,175	35,042	127,412	7,032
1894	5,534,621	1,095,588	936,422	6,048	1,125	.....	25,560	109,263	14,170
1895	3,650,258	697,476	536,797	5,365	.....	267	35,028	108,439	11,580
1896	5,889,241,	1,052,089	893,053	2,729	.....	9,370	34,299	105,472	7,166
1897	11,453,351	2,089,173	1,912,389	6,233	.....	8,513	33,490	115,754	12,794
1898	11,253,787	2,046,686	1,915,550	3,738	.....	17,574	31,619	51,045	27,160
1899	20,139,195	3,700,873	3,526,007	3,984	.....	12,384	41,810	74,813	41,875
1960	25,259,737	5,122,156	4,947,000	5,044	.....	7,210	43,176	66,069	53,657
1901	16,335,528	3,295,663	3,142,353	5,839	.....	.....	39,675	44,986	62,810
1902	27,855,978	5,660,541	5,459,300	41,149	.....	101	36,109	47,066	71,816
1903	34,128,944	6,954,618	6,554,014	10,225	.....	13	198,381	69,017	112,968
1904	24,568,001	4,724,155	4,400,774	6,497	14	25,644	75,014	88,422	127,790

CHEESE.

1868	6,141,570	620,543	548,574	68,784	.....	.....	891	1,594	340
1880	40,368,678	3,893,366	3,772,769	114,507	.....	.....	170	5,710	210
1890	94,260,187	9,372,212	9,349,731	6,425	.....	370	2,154	12,777	755
1891	106,202,140	9,508,800	9,481,373	13,485	.....	.....	1,954	9,104	3,884
1892	118,270,052	11,652,412	11,593,690	39,558	2	.....	2,124	12,942	4,091
1893	133,946,365	13,407,470	13,360,237	23,578	.....	.....	2,689	18,679	2,297
1894	154,977,480	15,488,191	15,439,198	9,552	.....	173	3,036	21,948	14,284
1895	146,004,650	14,253,002	14,220,505	5,058	.....	16	5,463	9,785	12,175
1896	164,689,123	13,956,571	13,924,672	10,359	299	.....	4,861	7,509	8,871
1897	164,220,699	14,676,239	14,645,850	4,486	94	24	5,365	11,954	8,457
1898	196,703,323	17,572,763	17,522,681	14,604	.....	1,428	6,889	12,784	14,377
1899	189,827,839	16,776,765	16,718,418	17,739	.....	.....	11,701	13,293	15,614
1900	185,984,430	19,856,324	19,812,670	4,836	.....	.....	8,774	16,651	13,393
1901	195,926,397	20,696,951	20,609,361	37,601	465	12	15,375	16,603	17,534
1902	200,946,401	19,686,281	19,620,239	12,038	.....	1,179	14,133	20,100	18,602
1903	229,099,925	24,712,943	24,629,004	7,779	.....	170	18,942	21,334	44,714
1904	233,980,716	24,184,566	24,099,004	5,386	44	.....	23,810	21,754	34,568

IMPORTS OF GREAT BRITAIN.

The following table from the Board of Trade returns of Great Britain for 14 years (ended December 31), shows the total quantities and value of butter and cheese imported into Great Britain :—

BUTTER.			CHEESE.		
Year.	Quantity.	Value.	Year.	Quantity.	Value.
	*Cwt	£ stg.		*Cwt.	£ stg.
1890	2,027,718	10,598,848	1890	2,144,674	4,975,134
1891	2,135,607	11,591,181	1891	2,041,317	4,815,369
1892	2,183,009	11,965,190	1892	2,232,817	5,416,784
1893	2,327,474	12,753,593	1893	2,007,462	5,160,918
1894	2,574,835	13,456,699	1894	2,226,145	5,474,940
1895	2,825,662	14,245,230	1895	2,133,819	4,675,130
1896	3,037,718	15,344,364	1896	2,244,525	4,900,342
1897	3,217,802	15,916,917	1897	2,603,178	5,885,521
1898	3,209,153	15,961,783	1898	2,339,452	4,970,805
1899	3,389,851	17,213,516	1899	2,384,069	5,503,004
1900	3,378,516	17,450,435	1900	2,705,878	6,837,883
1901	3,702,890	19,297,396	1901	2,586,837	6,227,135
1902	3,974,933	20,526,690	1902	2,546,612	6,412,002
1903	4,060,694	20,798,797	1903	2,694,358	7,054,710

* Cwt. : 112 lbs.

GENERAL DAIRYING SERVICE.

The Assistant Dairy Commissioner, who resides at St. Denis (en bas), devotes his time largely to the French-speaking districts of the province of Quebec. He has attended numerous meetings and delivered a great many lectures in the interests of dairying and general agriculture. He conducts a large correspondence, giving advice on various subjects, and assists in carrying on the syndicate system of cheese factory and creamery instruction which has been so successful in that province.

An instructor was sent to Prince Edward Island during the months of September and October, where he co-operated with the local instructor in giving assistance to the cheese and butter-makers on the Island.

The superintendents of the cool cheese curing-rooms were employed during the winter months in attending the annual meetings of factories, as well as special meetings arranged to discuss the advantages of the cool curing of cheese.

Numerous meetings have been attended in various parts of the Dominion by the Chief of the Division and members of his staff.

EXTENSION OF MARKETS DIVISION.

During the past year the extension of markets division has been continuing the work of : (1) assisting in the improvement of the transportation facilities between Canada and Great Britain for Canadian food products, particularly those of the more perishable sort, such as butter, cheese, eggs, fruits, &c., and (2) aiding in the extension of the sale of Canadian farm and food products in outside markets.

Under the first head came the work of inspecting and reporting upon the manner of handling, loading and unloading of farm products, from railway cars and steamers at Canadian ports and at the chief ports in the United Kingdom ; also the inspection at Montreal of refrigerator cars bringing butter and cheese from inland points for export.

The work of the division under the second head was more general in character, and was conducted chiefly by correspondence with Canadian shippers and British importers, and by the dissemination, through the medium of bulletins and the public press, of reports on the condition of Canadian food products when landed in Great Britain, and other information relating to outside markets.

INSPECTORS AT CANADIAN PORTS.

Four inspectors were again appointed for the season of navigation, at the port of Montreal to observe and report concerning the condition of Canadian food products when loaded in the steamers, the handling on the wharfs and in the process of loading, the stowage in the ships, and the ventilation of the different holds in which perishable cargo was stowed. During the season they furnished detailed reports of the shipments of cheese, butter, eggs, bacon, poultry, fruit, &c., forwarded in 281 sailings of steamers, as follows :—

From Montreal to :

Liverpool	85	sailings.
London	73	"
Glasgow	58	"
Bristol	28	"
Manchester	18	"
Leith and Aberdeen	10	"
Cardiff	2	"
South Africa	7	"
Total	281	"

During the winter season of 1903-04 one inspector was stationed at St. John, N.B., to look after the loading of food products exported via that port; and an inspector was also placed at Halifax as soon as this year's export movement in Nova Scotia apples commenced.

INSPECTORS AT BRITISH PORTS.

Inspectors appointed by the department were also stationed throughout the year at Liverpool, Manchester, London, Bristol and Glasgow. Their duties were to report fully to the chief of the markets division regarding the manner in which cheese, butter, eggs, fruit, &c., were handled in the unloading of the steamers, and the condition of these perishable products when landed on the docks. They were also instructed to do everything possible that will make for improvement in the safe discharge of cargo, and to advise the officials of the steamship lines of any rough work that might come under their notice.

It is a pleasure to state that the work of inspection maintained by my department on both sides of the Atlantic has been heartily supported by the officials of the various steamship lines concerned, and that the latter have always been ready to carry into effect any suggestions made by my officers that would promote the safe carriage of Canadian perishable products across the ocean.

During the year the leading provision firms in Liverpool, London and Glasgow have written in an appreciative strain of the beneficial results that have followed the appointment of inspectors at their ports. The following extract from a letter written under date April 18, 1904, by Messrs. G. & J. Nickson & Co. Ltd., Produce Commission Merchants, Liverpool, is fairly representative of all the letters received :

'The action of your department in maintaining inspectors at British ports for the purpose of reporting to the shippers and steamship people the manner in which Canadian products, more or less perishable, are stowed on discharge, and the condition of the goods on arrival, is having a most marked and beneficial effect on the development of the Canadian trade. My directors are of opinion that your department is to be very highly congratulated on the painstaking and helpful manner in which you are studying the largely developing trade between this country and Canada.'

INSPECTION OF REFRIGERATOR CARS.

Last season the work of inspecting the refrigerator cars bringing butter and cheese into Montreal for export, was placed under the direction of the extension of markets division. Two travelling inspectors were employed, whose duty it was to observe and report the condition under which butter and cheese were hauled from the factories to the railway stations, the temperature of the butter when loaded into the cars, and the condition of the cars as regards icing and cleanliness. They also visited the creameries that make use of the refrigerator car service, for the purpose of examining the cold storage chambers, and urging upon the creamery managers the im-

portance of keeping their butter at the lowest possible temperature, from the day it is made until it is loaded into the iced car.

Two inspectors were also stationed at Montreal. They examined the iced cars containing butter and cheese as they arrived and reported on the condition and temperature of the contents, as well as the condition of the cars as regards icing and cleanliness. The same packages of butter that had been tested at the shipping point were again tested at Montreal, in order to ascertain if the contents had become warmer or cooler during the journey. In this way much useful information was secured, and, at the same time, the weak spots in the service were located and strengthened. Any defect or deficiency, such as broken or clogged drainage pipes in the cars, badly fitted doors, lack of ice, &c., was promptly reported to the proper railway official, and the matter complained of was usually remedied forthwith. Moreover, the presence of an inspector was a constant check on the employees of the railway and cartage companies, and promoted the careful and prompt handling of the butter and cheese.

The refrigerator car service for butter was in operation from the 16th of May until the 22nd of October. In that time the two inspectors stationed at Montreal inspected 975 cars containing the following produce: 335,555 pkgs. butter, weighing 21,798,143 pounds; 10,285 boxes cheese, weighing 810,584 pounds; 421 cases eggs, weighing 27,500 pounds; 162 pkgs. lard, weighing 8,400 pounds. The cars containing a mixed freight did not form a part of the subsidized service, the latter with a few exceptions carrying butter only.

During the season the inspectors also recorded the temperatures of 2,296 packages of butter.

EXPORTS OF CANADIAN FARM PRODUCTS.

In the fiscal year ended June 30 last, the total exports of Canadian agricultural and animal products were valued at $100,950,992. These figures show a considerable reduction on those of the previous year, but the deficiency was largely caused by a shrinkage of $11,101,352 in our exports of wheat. On the other hand our exports of flour surpassed those of the previous year by nearly a million and a half of dollars.

During the past year, Great Britain, as formerly, proved the best customer for our farm products, taking over 90 per cent of our total exports. An ample margin remained, however, for the further extension of our trade in the United Kingdom, as, for every $100 worth of food and farm products supplied the mother country by Canada, other countries furnished her about $747 worth. This assertion is borne out by the following comparative statement, which shows the value of some Canadian farm products exported (*a*) to all countries, and (*b*) to Great Britain, in 1904; also the total value of the imports of similar products into Great Britain, in 1903 :—

Value of some Canadian Farm Products exported in the year ended June 30, 1904.	To all countries.	To Great Britain.	Value of Products of the same sort imported into the United Kingdom from all countries in the year ended December 31, 1903.	
	Dollars.	Dollars.		Dollars.
Butter	4,724,155	4,400,774	Butter	101,220,369
Cheese	24,184,566	24,099,004	Cheese	34,330,951
Eggs	1,053,396	1,036,035	Eggs	32,205,746
Poultry—Dressed or undressed	140,214	107,509	Poultry	5,855,019
Bacon	12,603,521	12,590,669	Bacon	66,279,815
Hams	418,740	406,051	Hams	16,510,527
Pork	496,507	23,851	Pork	9,123,618
Wheat	13,465,351	13,106,081	Wheat	145,710,652
Flour	6,129,226	3,568,430	Flour	47,316,634
Oats	1,603,104	1,213,413	Oats	20,751,116
Oatmeal	756,687	644,219	Oatmeal	2,615,420
Pease	1,133,268	525,102	Pease	3,361,587
Barley	489,437	330,401	Barley	35,133,995
Hay	1,897,730	974,678	Hay	2,710,451
Cattle	10,424,671	10,046,651	Cattle	44,817,727
Sheep and lambs	1,545,117	721,358	Sheep	2,657,506
Apples—Green or ripe	4,590,793	4,379,826	Apples—Green or ripe	13,535,893
Total	85,606,483	78,174,052	Total	584,137,026

During the year under review a noteworthy feature of our export trade in foodstuffs, to countries other than Great Britain, has been the remarkable increase in the exports of Canadian flour to Japan. According to the Japanese trade returns only $5,940.19 worth of Canadian flour was imported into Japan during the first eight months of the year 1903, whereas $81,755.67 worth was imported in the corresponding period in 1904.

In South Africa the financial depression still lingers and business has not yet resumed its normal aspect. Despite the adverse conditions, however, considerable quantities of Canadian foodstuffs have been shipped to that market by each monthly steamer of the direct Canada-South Africa line, and it is expected that the tariff preference recently granted to Canada by South Africa will stimulate our exporters to greater efforts in the future.

BULLETINS.

In the past year the following bulletins have been issued by the Extension of Markets Division :—

SESSIONAL PAPER No. 15

SEED DIVISION.

The work of the Seed Division has been continued during the past year with a view to (*a*) encourage the production and use of pure and selected seed of farm and garden crops, and (*b*) study the condition of the seed trade in its relation to the progress of agriculture.

CANADIAN SEED-GROWERS' ASSOCIATION.

The plan adopted by Professor Robertson, five years ago, to encourage the direct application of the principles which make for the improvement of farm crops by the systematic selection of seed from year to year, led up to the formation of the Canadian Seed Growers' Association at a meeting held in Ottawa, June 15 and 16. This organization is an outgrowth of the Macdonald-Robertson Seed Growers' Association. The minutes of the meeting, together with some general explanations regarding the growing, selecting and preserving of seeds intended for registration, have been published for distribution.

The object of this association is to advance the interests of seed-growers and other farmers by:

(*a.*) Making regulations respecting the growing, selecting and preserving of seeds of various kinds of farm crops for the guidance of its members.

(*b.*) Causing records to be kept of the history of seeds produced by members.

(*c.*) Fixing standards for seeds that may be eligible for registration.

(*d.*) Publishing information as to standards.

(*e.*) Issuing certificates of registration to members by which hand-selected seed or the product therefrom may be known from other seed.

(*f.*) Such other means as may be expedient from time to time.

Records of the history of seed of wheat, oats, barley, maize, flax, millet, pease and beans, also seed potatoes, produced by member are kept by the seed division. Certificates of registration are issued to members for seed that has had the benefit of at least three consecutive years of hand-selection. Four instructors in seed-growing and seed-selection are now employed by the department to act in the capacity of district superintendents of the association. Their work is largely of an educational nature: their inspection of the operations of seed-growers serves also to protect the interests of the association against fraudulent practices.

SPRING SEED FAIRS.

I authorized the officer in charge of the seed division to continue to assist in holding the spring seed fairs that were started last year, and to further develop this plan for providing special markets, at other central points, for the sale and exchange of seeds among farmers. Twelve seed fairs in all were arranged for and successfully held during the early spring months. Large quantities of high-class seed grain and potatoes were disseminated among farmers through the medium of these fairs. The prizes that are awarded each year for the best lots of seed brought out in quantity for sale do much to encourage care in selection and thorough cleaning of grain for seed purposes.

SEEDS TESTED FOR PURITY AND VITALITY.

It is gratifying to note the growing desire on the part of farmers to have definite knowledge of the purity and vitality of the seed they use, and the efforts of an increased number of seed merchants to supply farmers with seed of the best quality. Five hundred and eighty-four samples were tested for farmers and seven hundred and thirty-one samples for seed merchants during the past year. These were largely seeds of grasses, clovers, cereals, root crop and garden vegetables. Additional germinators and other equipment have been installed in the seed laboratory in order that the efficiency of the service may be maintained.

Five hundred and four samples of seed—principally of grass and clover seed—were secured by direct purchase from seed merchants in all parts of Canada, for the purpose of obtaining further information regarding the quality of the seed offered for sale in the various districts. The results of the analysis of those seeds gives evidence of a marked improvement in quality over those collected for the same purpose in previous years. The educational work in the matter of good seeds that was started by the seed division two years ago and carried on in all of the provinces through the medium of farmers' institutes, and newspaper and bulletin publications, has been fruitful of good results.

BILL RESPECTING THE INSPECTION AND SALE OF SEEDS.

After conferring with many of the seedsmen regarding the Bill respecting the Inspection and Sale of Seeds, that was introduced and discussed in parliament last year, I had its main principles embodied in a new Bill in a way to mitigate those

features which, it was contended, would unduly hamper seedsmen in their business. The amended Bill was introduced and discussed in parliament during the recent session, but on account of pressure of other important business, it was not made law. The object of the Bill is to supplement the educational work that is done, by providing an Act that may serve largely to prevent the further dissemination of seeds of noxious weeds through the medium of the trade in agricultural seeds, and to discourage unscrupulous seed merchants from misrepresenting the quality of grass and clover seeds sold by them to farmers.

COLD STORAGE DIVISION.

COLD STORAGE AND COOLED AIR ON STEAMSHIPS.

Although the Department of Agriculture is not paying any further subsidies to the steamship companies for the fitting up of steamers with 'cold storage' or 'cooled air' service, the various steamship lines are adding to their equipment from time to time in order to meet the growing demands for space of this description. The steamers have handled the large increase in the shipments of butter during the past season without serious shortage of space. Shippers have availed themselves very much more extensively than in previous years of the 'cooled air' service for the carriage of cheese. Thermographs have been placed in practically all the cold storage and cooled air chambers, and also in ventilated compartments along with butter and fruits. Copies of the thermograph records are filed in the Exchange Room at the Board of Trade, Montreal.

Particulars of the cold storage service and the amount of produce carried will be given in the report of the Commissioner of Agriculture and Dairying to be published as an appendix to this report.

REFRIGERATOR CARS FOR BUTTER.

The refrigerator car service for the carriage of butter was again operated by the railway companies under arrangement with the Department of Agriculture. Cars were started at 49 different points, and were available for shipments of butter at all stations on the routes to Montreal. The cars were run, weekly or fortnightly, according to the requirements of the route on an advertised schedule, so that shippers might know when to deliver the butter at the stations with the least possible exposure to heat.

Shippers were charged the current rates without extra charge for icing.

This service was in operation from May 18th to October 22nd. The department guaranteed two-thirds of the earnings of a minimum car, (20,000 pounds), plus $4 a car for icing. When the earnings exceeded the guarantee there was no charge against the department. If the traffic on any route exceeded one carload, the whole service on that route was held to be self-sustaining, and no claim could be made on the department, even if the earnings of the extra cars did not reach the amount of the guarantee.

The arrangement did not apply to special cars for taking a full carload from a single point.

The subsidy, or guarantee, was given to secure a regular iced car service for shippers of comparatively small lots, who would otherwise be compelled to pay for a whole car, or hold the butter until a carload was accumulated, in which case there would be serious deterioration in the quality of the butter.

Inspectors were employed going over the refrigerator car routes, reporting regularly on the working of the service, and endeavouring to have defects in the handling of the butter remedied as promptly as possible, whether they occurred at the creamery, in the hauling to the station, or while the butter was in charge of the railway company.

REFRIGERATOR CARS FOR CHEESE.

The department agreed to pay the cost of icing 105 cars a week, distributed among the different railroads, for the carriage of cheese to Montreal from July 1 to September 10.

The railway companies agreed to furnish the cars, properly iced, upon application from shippers, for the transportation of cheese in carloads, up to the number allotted to each carload. Although the summer was an exceedingly cool one, this service is reported to have been of great advantage.

COLD STORAGE AT CREAMERIES.

The bonus of $100 to creamery owners who constructed proper cold storages in connection with their creameries was continued for the year 1904.

FRUIT DIVISION.

Mr. W. A. MacKinnon resigned his position as chief of the fruit division during the year, and Mr. A. McNeill, formerly chief fruit inspector, was appointed in his stead.

While the fruit division is chiefly concerned with the administration of the Fruit Marks Act, more and more educational work is being undertaken every year. The fruit inspectors during the past year attended 130 orchard meetings, at which various topics of orchard management were discussed. The inspectors also attended fall fairs whenever possible, to give demonstrations in the proper methods of packing and marking fruit.

Demonstrations of systematic power spraying were carried on during the year in the neighbourhood of Wolfville, N.S., and also near Ingersoll, Ont. About 3,300 trees were sprayed several times during the season by each outfit. The success of this work is demonstrated by the fact that a number of co-operative societies and individual farmers have already adopted this method of treating their orchards.

A new feature of the work of the division, in 1904, was the issuing of fortnightly reports dealing with the prospects for the Canadian fruit crop, and the demand likely to exist for it in foreign markets. These reports were compiled from information received regularly from over five hundred correspondents in various parts of the country. The reports were sent to any person making a request for them.

The fruit inspectors and the members of the trade in Great Britain report a marked improvement in the packing and marking of Canadian fruit, since those engaged in the fruit industry in Canada have become more familiar with the provisions of the Fruit Marks Act. During the season of 1903-4, special attention was paid to the handling of fruit for export from the port of Montreal. Some complaints had been received regarding the way in which packages were handled during transhipment from railway cars to the steamers.

The inspectors have reported the actual examination of 20,702 packages of fruit belonging to over 2,000 lots, aggregating some 234,343 packages.

The Fruit Marks Act having now been in operation for three years was rather more strictly enforced this year than heretofore. Forty-nine prosecutions resulted in as many convictions.

POULTRY DIVISION.

Experimental and illustrative work is being carried on by the poultry division in the different provinces, largely through the medium of the breeding and fattening stations. The work of these stations is directed with a view of finding out the cheapest and most suitable houses to build, the most practicable incubators and brooders to use, the best utility breeds and types of fowl, the best way to manage young and growing chickens, and the best methods of feeding, killing and marketing the same. A type of fowl is being developed at the breeding stations which makes a profitable table bird and at the same time produces a good laying strain of pullets. These pullets are being sold to the farmers, at reasonable prices, for breeding purposes, as are also the eggs for hatching.

The diversity of climatic and other conditions in Canada multiply the difficulties in the way of successful poultry raising. For instance, a poultry house suitable for parts of British Columbia would not do so well in Manitoba; feeds which are cheap in Montreal might be out of reach in Alberta; the incubators and the instructions for their operation that give good results in Cape Breton or in Vancouver might not be satisfactory for the higher altitude of Calgary. These, and many other questions, the poultry division is endeavouring to solve.

The poultry stations are not expected to show a profit on the total expenditure: their work is too largely educational for that. The results must be looked for in the increased interest taken in these matters, by the desire on the part of the farmers to improve their stock, and by the improvement of poultry in general. As a result of this improvement prices are advancing. Throughout the older provinces where the stations were first established the farmers have

adopted many of the methods advocated at these stations. They are buying incubators, making brooders, crate-feeding their cockerels, and in place of selling them at six months for 25 and 35 cents a pair as was the case several years ago, they are now realizing from 50 to 80 cents for them at four months old. Dealers prefer to handle crate-fatted birds at several cents a pound advance in price, because consumers are willing to pay the increased price for the superior article.

Three new stations have been started this year at the request of many prominent farmers and poultry men, one in Quebec and two in Manitoba, and it has been arranged to start one in British Columbia next spring.

The managers of all the stations are expected to give every assistance to local men who are engaged in the poultry business. They frequently attend institute meetings and fairs, with exhibits to illustrate the work carried on at the stations.

During the past year the department has not shipped any quantity of dressed poultry to the old country, giving more attention to the development of the local markets. The efforts made in this direction have been attended with the most gratifying results.

LIVE STOCK DIVISION.

PLAN OF WORK UNDERTAKEN.

As explained in previous reports, the live stock commissioner has undertaken six special lines of work, viz.:

1. The establishment of farmers' institute systems in each province where such were not already in operation, and the improvement of such systems as already existed.

2. The improvement of agricultural societies and exhibitions.

3. The establishment of provincial auction sales of live stock.

4. The extension of interprovincial trade in live stock.

5. The establishment of interprovincial live stock associations and provincial educational shows.

6. The publication of bulletins on live stock and kindred subjects.

A brief outline of the year's work, with special mention of valuable features recently adopted, is attached.

BRITISH COLUMBIA.

Farmers' Institutes.

In March and April, Major Jas. Sheppard was sent to British Columbia, and he, assisted by local men, conducted thirty-three institute meetings with an aggregate attendance of 892 or an average of 27. A large number of these meetings were held in the sparsely settled districts which had never before been reached in this way. The meetings were all well attended. Many came long distances to attend, and the interest manifested was very gratifying to the speakers.

Fairs Improvement.

Four judges were sent in autumn of 1904 to attend a number of leading fairs in the province. After the fairs, these men remained to address a series of institute meetings which had been arranged at the request of the division by the Deputy Minister of Agriculture for the province.

NORTH-WEST TERRITORIES.

Judging Classes.

In the months of January and February, short courses in stock-judging were given at seven principal stock centres in the Territories. At each place a two or three days' meeting was held, the daylight sessions in every instance being devoted to teaching practical stock-judging, and the evening sessions to discussions of various agricultural subjects.

Mr. Geo. Harcourt, superintendent of institutes and fairs for the Territories, assisted the live stock commissioner in arranging these courses.

MANITOBA.

Judging Classes.

In February, a series of short courses in stock-judging was arranged by G. H. Greig, the representative of the live stock division in the province and secretary of the live stock associations there, with the assistance and co-operation of this division. Speakers were sent out who conducted the classes. These were organized at Neepawa, Brandon and Winnipeg, and were largely attended. The keenest interest was taken in the judging classes during the day and in the discussions on subjects related to practical agriculture in the evenings. These short courses in stock-judging bid fair to become the most profitable line of educational work of this nature yet attempted.

ONTARIO.

First Spring Stallion Show, Ottawa.

In February, the Eastern Ontario and Quebec Horse-breeders' Association organized, with headquarters at Ottawa. This association held its first Annual Spring Stallion Show in connection with the Eastern Ontario Fat Stock and Dairy Show, in March. A very successful exhibition was held, with over sixty registered stallions entered. The educational features of the show were developed as much as possible. Addresses by the best qualified men that could be procured were given on conformation, breeding, feeding, stabling and markets. A keen interest was maintained throughout, and the success of the show was very gratifying.

Building for Winter Fair at Ottawa.

So favourably were the people impressed last year with the educational value of a winter fair, that the city of Ottawa undertook to provide a large and suitable building and to place it at the disposal of the Live Stock Association for this purpose. Accordingly, the city council erected this year a large and well-equipped building costing upwards of $25,000.

Third auction sale, Ottawa.

An auction sale of pure bred cattle was held in Ottawa in April, at which twenty-nine cattle were sold at an average price of $67.25. A number of the animals offered were calves that had recently been weaned which accounts in a large measure for the somewhat lower average than had been reached in previous years.

QUEBEC.

In January, February and March, a series of Farmers' Institute meetings were held. As far as possible at least one meeting was held in every county in the province. In the case of counties in which there were both English and French speaking districts, meetings in both French and English were held. These meetings were very widely and persistently advertised, the co-operation of prominent local men was in each instance solicited by correspondence weeks before the meetings, these men were asked to exert themselves to work up local interest, and nothing was left undone that seemed likely to contribute to the success of the meetings. The result amply justified the effort. The total attendance at these meetings was 22,277, or an average of a little over 220, most of whom were farmers. The lecturers were unanimous in reporting an increased interest in the topics discussed.

By my direction this division undertook to assist the directors of the Brome Agricultural Society to conduct a model fair.

FAIRS IMPROVEMENT.

A portion of the fair grounds, therefore, was set apart for experimental plots. This was divided into three ranges, which were each sub-divided into plots 12 x 15 feet, and sown with the crops indicated in the subjoined diagram.

Hairy Vetch.	Mangolds Yellow Intermediate.	Red Clover.
Grey Vetch.	Mangolds Long Red.	Mammoth Red Clover.
Turnips, Greystone.	Carrots, White.	Alsike.
Turnip Swede.	Butter Corn.	Lucerne.
Forage Mixture (oats, pease, vetch)	White Cap Yellow Dent Corn.	Orchard Grass.
Forage Mixture (oats, pease, wheat)	Champion White Pearl.	Brome Grass.
Japanese Barnyard Millet.	Leaming.	Tall Oat Grass.
Rape and Millet.	Red Blaze Corn, Sandford Corn.	Meadow Fescue.
Rape.	Potatoes.	C. E. F. mixture hay or pasture.
Rape.	Potatoes, sprayed.	O. A. C. mixture hay or pasture.

On the day of the fair Mr. C. A. Zavitz, Prof. of Field Husbandry at the Ontario Agricultural College, Guelph, lectured on the characteristics and usefulness of the various crops grown. These talks attracted large and appreciative audiences, many interesting discussions were provoked and much valuable information elicited.

Competent judges were furnished to this society for all classes of live stock. These expert judges explained the reasons for their decisions whenever called upon to do so, pointing out to the spectators the desirable and undesirable points in the various animals under consideration.

Expert judges were also furnished who did the same work in the same way at Huntingdon, Stanstead and Buckingham.

NEW BRUNSWICK.

Farmers' Institutes and judging classes.

Speakers were again sent to the Annual Convention of the Farmers' and Dairymen's Association which met in March. Farmers' Institute meetings were also held at Woodstock, Sussex and Chatham. These were well attended and much interest taken. Judging classes were held and valuable discussion provoked.

Fairs improvement.

A special effort was made this year to assist the management of the provincial exhibition at St. John.

They wished to make their fair more educational and to this end asked the co-operation and assistance of the department. It was agreed that this division take control of the judging of the agricultural and horticultural products, and of all the classes of live stock except light horses.

The judges delivered addresses in the ring as before described. This proved a very valuable and popular feature of the exhibition, attracting large audiences of intelligent people.

School Children's Exhibits.

A special effort was made at this exhibition to encourage school children's exhibits after the plan outlined in previous reports. The results were very gratifying. Eighty-three collections in all were exhibited, many of them comprising upwards of 100 specimens carefully mounted. These exhibits all bore evidence of much care in collecting, mounting and naming. For extended notes see report of Live Stock Commissioner, 1903-04.

The management reports that this exhibition was the most successful ever held in St. John.

Judges were also sent by this division to three of the largest and most important county fairs in the province : viz. Sussex, Woodstock and Chatham.

After these fairs the judges remained in the province to address a series of Farmers Institute meetings. In all 94 meetings have been arranged for and are now in progress.

NOVA SCOTIA.

At the request of the Hon. J. W. Longley, the Live Stock Division co-operated with the management of the provincial fair at Halifax to make it more educational. Judges were furnished for all classes of stock except light horses. Addresses were delivered by the judges in the ring and explanations of the awards given. Particularly strong points in the various animals were brought to the attention of the spectators and exhibitors. In this way interest in the judging was maintained and valuable information imparted in a practical way. Provision was made for a farmers pavilion and lecture hall and a daily programme of lectures and discussions on subjects of interest to farmers. The programme of lectures and judging was printed and widely distributed so that visitors knew at a glance what was going on at any given time in any department of the fair.

PRINCE EDWARD ISLAND.

Fairs Improvement.

At the request of the management of the provincial fair at Charlottetown, this division took charge of the judging of agricultural and horticultural exhibits, in addition to all classes of live stock except light horses, and provided a programme of lectures for each afternoon and evening during the progress of the fair. As in the case of Halifax, a suitable pavilion was provided, the evening lectures being illustrated with stereopticon views. These lectures attracted large and interested crowds and proved a valuable innovation.

NATIONAL ASSOCIATION.

In March, 1904, the First Annual Convention of Canadian Stock Breeders ever held in Canada met in Ottawa. This convention was called by me, and was the most important event of recent years in connection with Canadian live stock interests.

Purposes of Convention.

The purposes of this convention were to bring the stock men of the various provinces together to discuss questions of national importance that could not be dealt with by provincial associations, and incidentally to lead the breeders of the different provinces to realize that their interests are mutual and are broader than provincial limits; that the prosperity of the live stock men of any province is an advantage to the whole Dominion. It was also believed that by bringing the leading stock men of the country together for the discussion of subjects in which they have a common interest a friendly feeling would be engendered and interprovincial trade thereby promoted.

The result of the convention amply justified its being. The important subjects introduced were discussed in an exhaustive manner. For complete report of this convention see Live Stock Commissioners' report, 1903-04.

EXPERIMENTAL FARMS BRANCH.

Considerable progress has been made during the past year in all the divisions of the work carried on by the experimental farms and their continued usefulness amply demonstrated. At the time these valued institutions were established it was intended that they should become bureaus of information where farmers could apply for advice on all agricultural and horticultural topics whenever required. That they have served this purpose in a notable degree is evident from the rapid and persistent growth of the correspondence had with farmers at all the farms.

MUCH INFORMATION GIVEN TO FARMERS.

In 1888, the first year after the farms had become well organized, the number of letters received at all the farms was about 8,000; within three years the number had increased to over 20,000, and for the past six years they have averaged yearly 66,222. During the same period the number of bulletins and reports sent out annually has averaged 220,646. Thus a constant stream of information has been going out from the farms carrying untold benefits to farmers to the remotest corners of the Dominion. A large number of farmers visit the experimental farms to gain information by observation. These see the work in progress, study the marked benefits to be derived from it and go home to put in practice what they have learned.

THE WAY PREPARED FOR AGRICULTURAL ADVANCEMENT.

The experimental farms have prepared the way for agricultural advancement, and have by experimental work furnished proof of the value of modern ideas and improvements, and have thus led to their more general adoption.

ADVANTAGES OF EARLY SOWING.

The gain resulting from the early sowing of cereals has been clearly demonstrated in a series of experiments which were carried on for ten years. Each year, six successive sowings were made at intervals of a week on plots of one-tenth acre with two varieties each of wheat, oats, barley and pease. The results furnished conclusive proof that delay in sowing resulted in loss of crop, the loss becoming more serious as the delay was greater. The conclusions reached from these experiments have been widely published, and farmers have been led to give increased attention to early sowing, and crops have thus been increased.

BENEFIT TO FARMERS BY CO-OPERATION.

Not only have Canadian farmers reaped much benefit from the experiments conducted at the experimental farms, but by providing them with material and suggestions, they have done some experimenting for themselves, by testing on their own farms some of the most promising varieties of the leading agricultural crops. They have thus gained for themselves important information as to the relative usefulness of the more promising sorts of cereals and other crops in their own climate and on

their own soil. The extent of this work, which is going quietly on in every part of the Dominion, and the benefits arising from it, are but imperfectly understood by the public generally. More than 40,000 farmers, scattered throughout the length and breadth of Canada, take part in this work annually, and to provide the 70 to 75 tons of material required for this purpose, which is always of the best and purest, needs much careful consideration and forethought. The value of this part of the work it is difficult to overestimate; it is greatly appreciated by farmers everywhere, but to the new settler in this country it is a great boon, as he may thus be at the outset provided with a start in the cultivation of varieties proven to be the most prolific and of the best quality obtainable. If handled carefully, the samples sent him will, by the end of the second or third season, supply him with all the seed required for cropping large areas of land.

INVESTIGATIONS CONTINUED.

Among the more important branches of experimental work conducted from year to year are the comparative trials made with different sorts of artificial fertilizers, and with combinations of these fertilizers, as compared with barn-yard manure, to ascertain their relative influence on different crops; the experiments conducted to gain further information as to the value of clover for ploughing under to enrich the soil; the testing of many different sorts of fodder crops, and the comparative trials made with all the best varieties of cereals and other important farm crops obtainable. New cross-bred sorts of grain have also been produced and are being tested in comparison with the best sorts now in cultivation. Additional new cross-bred varieties of fruits have also been produced for trial in the North-west country. These and many other important lines of work have been zealously pursued by the several officers composing the experimental farm staff, during the past year, with good results.

USEFUL BULLETINS RECENTLY ISSUED.

During the year, under my direction, some valuable publications have been issued and distributed widely among the farmers of Canada. These include Bulletin 44, in which is published the results obtained in 1903 from trial plots of grain, fodder corn, field roots and potatoes, prepared jointly by the director and the experimentalist; Bulletin 45 on Alfalfa, prepared jointly by the agriculturist, the chemist, and the entomolgist and botanist; Bulletin 46 on Emmer and Spelt, by the experimentalist, with an appendix by the assistant chemist, and Bulletin 47 on Trees and Shrubs tested in Manitoba and the North-west Territories, by the director. This last bulletin embodies the results of the tests carried on at both the western experimental farms for the past fifteen years to determine the relative hardiness of many different sorts of trees and shrubs in the Canadian North-west, and will be found a useful guide to all who may desire to adorn their homes or grounds with these objects of beauty in the north-west country.

CONTRIBUTIONS TO EXHIBITIONS.

Large contributions of agricultural material were got together from the crop of 1903 and prepared at the several experimental farms for display at the Louisiana

Purchase Exposition at St. Louis. These consisted mainly of grain of many sorts, both in straw and threshed, also fodder crops, grasses, fruits and vegetables in great variety, also honey. An exhibit of roots and potatoes was likewise sent to St. Louis from the experimental farm at Brandon in the autumn.

Similar material was also provided for the exhibitions of Canadian products made during the past year in Great Britain and a considerable quantity of suitable material has been got together from the crop of 1904, for display in connection with the Canadian exhibit to be made at Liege, Belgium, during the season of 1905.

ATTENDANCE AT MEETINGS.

Under my instruction the officers of all the experimental farms have attended some of the more important meetings of farmers and fruit-growers held in different parts of Canada. This assistance has been much appreciated by those attending such meetings, and at the same time opportunity has been afforded for bringing more prominently before the farming community the results had from many useful lines of work carried on at the several farms.

AGRICULTURE AND LIVE STOCK DIVISION.

In the agricultural division the work carried on during the past year has been: (*a*) a study of methods of soil improvement (*b*) a study of soil cultivation, and (*c*) a study of the comparative yield of the different more commonly cultivated crops when grown under similar conditions.

The soil.—For five years a rotation of five years duration had been followed on the farm proper, and very marked results noted, so marked indeed that it has been decided to try to determine the comparative value of a number of rotations of different lengths and descriptions as factors in soil improvement. Twelve different rotations are now under test, and one year's work has been done with each. The results are as yet, of course, quite far from being conclusive.

In addition to the experiments in rotations a study is being made to determine if possible the effect of deep as compared with shallow ploughing, and the question of early as contrasted with late fall ploughing is also receiving careful study; the results so far go to show that the early ploughing, if at all possible of accomplishment, is by a good deal the more advisable.

Crops.—The field crops common to Canada are grown, and a study is being made of their comparative economy as food or forage producers.

Indian corn is grown extensively and has been found to be exceedingly valuable as a feed for all classes of live stock, both as grain and roughage. It has been found to be much more economical to preserve it as ensilage and feed it to cattle in that form than to attempt to dry it in the stook, as is very commonly done.

Roots have been grown extensively and have been compared with corn as to economy of production, and value as feed for different classes of live stock.

Different sorts of oats are grown extensively, and our experience goes to show that for this part of Canada the Banner is easily the heaviest cropper.

Clovers are grown quite largely, and our results show that as soil improvers and food producers combined they are of unsurpassed value to the farmer.

Alfalfa has been grown for a number of years with great success, and a bulletin on its culture and use has been written, and was issued in June last.

In the animal husbandry division work is being done with dairy cattle, beef cattle, steers, sheep and swine, to determine the comparative economy of different foods as milk and flesh producers, and to determine the most economical rations, or food mixtures, to feed.

Dairy cattle being recognized as the most important class of live stock in this part of Canada, are kept in considerable numbers, and numerous experiments have been conducted with them to gain information as to the best feeds for them, the best methods of feeding, the best classes to keep, the best lines of breeding to follow, the influences of different feeds and conditions on the milk yield and quality, and the best care to give in both summer and winter.

Beef cattle are kept in small numbers. An effort is being made to ascertain whether it is possible to combine dairying and beef production profitably in the same herd. Results, so far, seem to indicate that, while it can be done profitably, there is much more profit in keeping a purely dairy herd.

Steers are fed quite extensively for beef production and have during the last year been fed to determine : the best feeds to feed, the best age at which to fatten off, the best method of housing them, the best way to bed them, and the comparative value of certain feeds.

Swine.—The production of pork for bacon manufacture is always a problem of primary importance, and some experiments are always under way with a view to gain some light on the various difficulties which meet the pork producer at every turn. During the last year it has been attempted to gain some information as to the best method of wintering fall litters and the best feeds to give them. The results secured seem to show that it is quite impossible to winter small pigs profitably unless a good warm pen, well lighted and well ventilated is available. The best foods of all to feed such pigs seem to be shorts and skim milk ; where skim milk was not used a small addition of oil cake to the shorts seemed to be the best substitute, about one oil cake to eight or less of shorts.

Sheep.—Two breeds of sheep are kept on a small lot of ground and an effort is being made to determine if possible the number of sheep that may be kept on a given area and the profit that may be expected from them. The breeds kept are the Shropshire and Leicester.

HORTICULTURAL DIVISION.

During the past year the work of the Horticultural Division has progressed favourably, and although the winter of 1903-4 was very severe, killing many apple and plum trees and weakening others, the orchard on the whole looked well.

Much experimental work was carried on and information gained which will be of value to horticulturists in Canada.

Notwithstanding the damage done to fruit trees, last winter was one of the best test winters there has been since the Central Experimental Farm was established. About 700 varieties of apples have been tested at Ottawa, and while some of these had killed out from time to time, after a few years' test there were still many others which up to last winter were of doubtful hardiness. A large number of these were killed by the severe frost, and it is now possible to say more definitely what kinds among those tested will be found quite hardy, where as severe a winter as last winter is likely to occur. This definite information will be of the greatest value to persons intending to plant trees. A large number of varieties which had not proven hardy when grown in the ordinary way had been top grafted during recent years, in order to learn whether they would succeed when grown on hardy stocks. These were practically all killed to the stock last winter, thus proving that they were not made much, if any, hardier in wood by top grafting.

Experimental shipments of apples to Ireland.—Five shipments of apples in boxes were made to Ireland this year, the object being to learn whether in a season when the markets of Great Britain were glutted with home grown fruit there would be a good sale for Canadian apples in Ireland. The experiment indicated that there were sufficient summer apples grown in Ireland to meet the local demand, and Canadian summer apples of the Duchess type were not wanted. The first three shipments barely covered expenses, but the Wealthy apples sent later sold at 4-6 a box, which allows a fair, though not large, profit to the shipper, and more of this kind were asked for. All the apples reached Ireland in good condition.

Seedling Fruits.—A large collection of seedling fruits, especially of apples, is being brought together at the Central Experimental Farm, and some of these are proving very desirable. The originators of these fruits send samples to the horticulturist, and if thought worthy of trial scions are asked for, in order that the varieties may be further tested. A number of new seedling varieties was added to the collection this year. A large number of seedlings of the best varieties which have fruited at Ottawa are also under test, and more of these were planted again this year. Some work was also done in crossing apples, the aim being to get a first class hardy winter fruit.

Experiments in Spraying Potatoes.—Although it has been proven at the Central Experimental Farm and elsewhere over and over again that spraying with Bordeaux mixture will prevent blight and rot, farmers are still slow to take advantage of this remedy. Experiments are, therefore, continued in order to keep this important fact prominently before them, new mixtures being tried with the other for comparison of results. Potatoes which have been sprayed have averaged much more per acre than where left unsprayed.

Tobacco Experiments.—Each year a test is made with different varieties of tobacco, and notes are taken on the growth, yield and relative maturity of each. Some good tobacco was grown this year.

Forest Belts.—The forest belts which bound the north and west sides of the farm are affording valuable object lessons to farmers and others of the advantage of planting trees. In these belts—the planting in which was begun seventeen years ago—are to be found most of the best Canadian timber trees, which are being grown for the purpose of determining their relative growth, both when grown in blocks of single species and in mixed plantations. Measurements are taken each year of the average trees of the different kinds, so that definite information may be obtained of their rate of growth. The shade-enduring capacity of the different species is also being noted in the mixed plantations, some kinds being killed outright when shaded, while others live on though making little growth. Other useful purposes of these belts are to serve as windbreaks to the farm, and to improve the landscape.

Arboretum and Botanic Garden.—The arboretum and botanic garden at the Central Experimental Farm is for the purpose of growing and testing trees, shrubs and herbaceous plants, in order to learn which species and varieties will succeed under cultivation; also to afford material for botanical studies. The collection there is being augmented every year and in the number of species and varieties growing there, in facilities for the examinaton of specimens, and in general arrangement, it compares very favourably with other botanic gardens in America.

Cover Crops.—Orchard cover crops have received much attention at the Central Experimental Farm, as it is believed that they play an important part in successful fruit culture. Among the plants which have been recently tested for this purpose the hairy vetch and English horse-bean are the most promising. The vetch makes a strong growth in autumn and makes a good covering for the ground in winter, and adds much nitrogen to the soil. The horse-bean grows until near winter and stands up during the winter and catches the snow which is so necessary in orchards to protect the roots of trees. It also adds nitrogen to the soil.

ENTOMOLOGICAL AND BOTANICAL DIVISION.

The work of this division has been carried on in much the same directions as in previous years. The division is now being recognized throughout the country as a source of reliable information concerning the habits of insects injurious to crops, or with regard to those species which are nature's restraint upon the undue increase of these enemies of the farmer and fruit-grower. Likewise many inquiries have been received concerning native plants and their suitability for cultivation, or as to the best way to eradicate those kinds which are, or are likely to become, agricultural pests. The poisonous weeds on the stock ranges have been made a special subject of investigation.

I have been glad to arrange for the entomologist and botanist to attend meetings and deliver addresses on subjects connected with the investigations carried on in his department in many parts of the Dominion. Series of meetings were held in the maritime provinces and the North-west Territories, and many addresses have been delivered at meetings of agricultural societies, farmers' institutes and horticultural societies.

The testing of fodder plants of all kinds has been continued at the Central Experimental Farm, and much correspondence has been carried on with farmers on this important subject.

Collections.—The collections of plants and insects at the Central Experimental Farm have been largely increased in all orders during the past year, many additions to the herbarium and cabinets having been made from collections of previous years, which have been mounted and placed in the cases where they are now available for easy reference, and where they have been made use of by many students who have visited the division. The great interest lately shown in weeds of the farm, and a fuller appreciation of the value of the clean seed, have caused much inquiry concerning weed seeds in the crop seeds purchased or saved by farmers for seeding. The large collection of weed seeds in the division has enabled the officers in all instances to report promptly on samples sent in, and give advice as to the real value of the samples submitted.

The Argenteuil Sand-hill.—A large and increasing tract of drifting sand, near Lachute, in the province of Quebec, has for many years, like others of a similar nature, been a menace to farmers of the districts where they occur. With a view of learning whether any practical steps could be taken to combat the encroachments of the sand, I instructed the entomologist and botanist to visit the Lachute locality and report to me if any practical measures could be adopted to control this nuisance and what could best be done to assist the farmers living around the margins of these shifting areas. Some steps have already been taken, and roots of the valuable beach grass which has been already largely used for this purpose in different parts of the world, have been distributed, as well as young trees of suitable kinds and cuttings of willows and poplars. These have all been gladly planted by the farmers who have themselves done much under the circumstances and with very satisfactory results. Next season, further efforts will be made of a similar nature, and it seems possible that with energetic effort for a few years much of this area which was formerly fertile farming land may be reclaimed.

Insect Enemies.—The entomologist and botanist reports that on the whole the season of 1904 was not marked by the occurrence of any serious plague of insects. Of those kinds of insect enemies which have most demanded the attention of the division and concerning which the entomological branch was able to disseminate useful information, the following may be referred to :—

Cereal Crops.—Grain crops, on the whole, have been very free from injury by insects. The only outbreak of importance was a reappearance of the Wheat Midge in the rich lands of the Fraser River valley, in British Columbia. The occurrence was very restricted in area, but the loss in the attacked fields was serious, and advice has been given by which, it is hoped, the increase of this enemy of the wheat crop will be prevented. A satisfactory feature of the year was the practical disappearance of some of the regularly-occurring enemies of grain crops. The Hessian Fly was reported only from one locality, in Prince Edward Island, and the loss from this insect was inappreciable, while a few years ago it caused many wheat-growers to take up other lines of profitable use for their land. A similar satisfactory state of affairs

prevailed with regard to the Wheat-stem Maggot and Locusts in the west. The Pea Weevil did less harm in 1904 than for many years previously, and, as a consequence, many growers who, this season, for fear of the Pea Weevil, had almost relinquished the cultivation of this desirable pulse, will next year put in a much larger area to it. The entomologist is urging the great advisability of care being taken by farmers to treat all seed before sowing, as this is the surest way of keeping down the numbers of the weevil.

The Grain Aphis was again abundant in some parts of the North-west Territories, but does not appear to have done very much harm.

Rust.—The crop pest which probably affected the output of the grain fields of the west to the largest extent was Rust, of which a sudden epidemic at the end of August injured wheat and oats considerably. This was an almost unprecedented occurrence in the prairie provinces, and, owing to the exceptionally late backward season, the grain plants were still sufficiently green for harm to be done by the parasite during the dull wet weather which set in before harvest, and which is so unusual in Manitoba and the North-west Territories.

Fruit Crops—The San José Scale.—The investigation of remedies for this most pernicious insect have been continued with satisfactory results. The Oregon Lime and Sulphur Wash has been extensively tested in the district infested by the scale, and good, clean crops of fruit have been secured, while at the same time the numbers of the scale have been materially reduced in treated orchards. Experiments have also shown that a useful wash may be made by reducing the sulphur in this wash, by mixing it with fresh lime and slaking with a solution of caustic soda. This method obviates the necessity of boiling the wash for two hours, a tedious and unpleasant operation.

Apple Maggot.—A destructive enemy of the apple, which on only two previous occasions has been recorded as injurious in Canada, wrought considerable destruction in the Fameuse crop, at Como, in the province of Quebec. It had appeared in some numbers in 1903, but during the past season was much more abundant. Means have been adopted to make the best remedies known.

Plum-leaf Sawfly.—An enemy of the plum, not of very great importance, but requiring attention, is a sawfly, the larva of which attacks plum leaves in autumn. This is *Dimorphopteryx pinguis*, and has been rather abundant at Ottawa during the months of August and September for some years. The life history of this insect has been fully worked out.

Strawberry Weevil.—A troublesome pest of the strawberry, *Anthonomus signatus*, which destroys the flower buds before they open, did some harm in western Ontario.

Root Crops and Vegetables—Cutworms.—Several species of Cutworms were complained of in different parts of the Dominion; the worst attacks were in Nova Scotia and New Brunswick. The poisoned-bran remedy was tried by many, as advised by the entomologist, and invariably gave satisfaction.

Root Maggots.—The destructive Root Maggots of onions, cabbages and radishes were abundant in many districts. An investigation of remedies was undertaken and will be continued next year. For small areas, cheap cheese-cloth coverings gave perfect immunity, and better and earlier crops of the above-named plants were secured.

CHEMISTRY DIVISION.

As in past years, this branch of the experimental farms work has rendered important and valuable assistance to Canadian agriculture by the prosecution of research in matters of more or less general interest to farmers, and by the dissemination of information by correspondence, lectures and bulletins. It would seem evident, from the increasing correspondence of the division and the large number of samples of an agricultural nature forwarded to the laboratory for examination, that there is a growing desire on the part of the Canadian farmer to benefit by the work of the chemist.

Among the more important of the numerous investigations that have engaged the attention of the chemist and his staff, during the year 1903-04, brief mention may be made of the following:—

Soils.—The examination of virgin soils representative of large areas of as yet unoccupied, or but partially occupied, lands, has been continued. These include soils from various districts in British Columbia, the North-west Territories and New Ontario. Detailed accounts of these appear in the report of the experimental farms for the current year. As far as is practicable, deductions have been made from the analytical data respecting the suitability of these lands for various crops, and information given as to the most economical methods for maintaining and increasing their fertility.

The Maintenance of Fertility through the Growth of Legumes.—Further experiments have been carefully conducted in this important research. They corroborate previous results in showing that in this class of plants (the clovers, &c.) we have the means of readily and cheaply enriching the soil in organic matter (humus) and nitrogen—the former improving the general tilth, and the latter becoming, by nitrification, a valuable source of food for subsequent crops. Practical experience throughout the length and breadth of Canada is year by year bearing favourable testimony to this means of increasing the soil's productiveness. It, undoubtedly, is the only method giving results at all comparable to those obtained from the use of farm manures. Trials have also been made with the new cultures of the nitrogen-assimilating bacteria recently prepared by the Department of Agriculture, Washington, D.C., U.S. The results can only be given as fairly successful, and further work must be done before anything definite can be said as to the practical utility of this new culture.

Soil Moisture Investigations.—The fourth season's work towards ascertaining the effect of various cover crops, cultivation, &c., upon the moisture content of orchard soils, has been brought to a close, furnishing information that will prove of service in orchard management. These investigations have been conducted on the experimental farms at Ottawa and Nappan, and include trials with oats, buckwheat, pease, hairy

vetch, soja beans and horse beans, as compared with clean culture. Much attention has been paid of late to soil management by orchardists, and although the treatment must necessarily differ in detail according to locality, nature of soil, &c., the system that gives clean cultivation during the early part of the season followed by a leguminous crop is the one most widely adopted. The results obtained from the experiments of this division clearly show that in those localities where during the early part of the season there may be an insufficiency of moisture for the trees' growth, the orchard soil should be given clean cultivation, say, till July 1. A cover crop should then be sown. This will serve to enrich the land, hasten the ripening of the wood and furnish protection to the roots during the ensuing winter.

Fodder Plants and Feeding Stuffs.—Valuable additions have been made to our knowledge of the relative values of feeding materials by the analysis of the various farm roots, fodder corn, certain mixed ensilages, &c. There has also been examined a considerable number of milling by-products, proprietary cattle foods, and the so-called stock and condimental foods now upon the Canadian market.

The feeding value of the straw and grain from rusted wheat—a matter of some importance this year to farmers in Manitoba—has been determined.

The composition of Emmer and Spelt, varieties of wheat now widely exploited for feeding purposes, has been ascertained, the results appearing as an appendix to Bulletin No. 45, issued during the past year.

In addition to detailed accounts of the aforementioned investigations, the report of this division for the current year will be found to contain analyses of certain new insecticides and fungicides, of about one hundred well waters from farm homesteads and creameries, and of a number of samples of wood ashes, bone, fish refuse, and other materials of a fertilizing value.

CEREAL BREEDING AND EXPERIMENTATION DIVISION.

The establishment of this as a separate division of the work of the experimental farms has made it possible to greatly enlarge the scope of the investigations which are being carried on, and to introduce some new features of much practical value.

Breeding New Cereals.—Several hundred new varieties of cereals (principally wheat) have been originated in this division during the past year. From among these it is expected that some very valuable sorts for general cultivation will be available after a few years, when the different types have been fixed by careful selection.

The more important of the older cross-bred sorts, produced at the experimental farms, have been thoroughly re-selected in order to bring them, as far as possible, to a condition of absolute uniformity. Many new strains of special merit have also been obtained by the selection of heads or plants exhibiting unusual excellence. It is believed that in this way a considerable improvement has already been made upon the varieties from which the selections were made, especially in regard to earliness in ripening and quality. Good progress has also been made in the purification of some of the most important standard varieties of grain which are now in general cultivation

in a more or less mixed and unsatisfactory condition. All of these new selections are being propagated as rapidly as possible, and the best of them will be introduced to the public as soon as a sufficient quantity of seed has been obtained.

The work of cross-fertilising in cereals has been continued as usual, a number of interesting crosses having been effected.

Quality of Wheat.—In view of the great importance of maintaining the high quality of Canadian wheat as grown on the great plains and elsewhere, and the desirability of improving this cereal as grown in some of the older sections of the Dominion, a thorough study of the varieties of wheat now generally cultivated seemed necessary. I, therefore, authorized this year, the purchase of a small roller-process flour mill for experimental purposes. This mill has now been in use for some time and has been found admirably adapted for grinding very small quantities of wheat. An investigation into the quality of the different varieties of wheat as grown in the various climates and soils of the Dominion is now being carried on, the flour produced by the small mill being subjected to chemical and mechanical analysis and to baking tests. The results of this work will be given to the public as soon as possible, with a view to encouraging the growing (for flour making) of only those sorts of wheat which will give a product of high quality.

The numerous cross-bred varieties of wheat produced at the experimental farms are also being tested in the same way so that only those of known excellence will be retained for propagation and distribution.

Comparative Test Plots.—The comparative tests of standard and new sorts of cereals, field roots and fodder corn have been continued as usual, and valuable information has been gained in regard to the relative productiveness, earliness and other characteristics of the different varieties under test.

Emmer and Spelt.—During the past year there was prepared, by this division, Bulletin No. 45 of the experimental farm series, describing the different varieties of emmer and spelt and discussing their value and uses as farm crops.

POULTRY DIVISION.

In this department experimental work in connection with egg production in winter and the superior quality of poultry in early summer was continued. Careful note was taken of the rations best calculated to bring about the greatest egg production at the cheapest cost. Experience so far gained goes to show that variety in the composition of rations is attended with beneficial results. It has also been learned that fresh air and exercise are factors in securing strong germs in the eggs laid by hens in early spring time, and which hens have also been winter layers. The necessity of having breeding stock of undoubted constitutional vitality has been shown with no uncertain sound. During the year the following new varieties were added to those already in stock, viz.: Silver Laced Wyandottes, Light Brahmas, and Silver Spangled and Black Hamburgs. With the addition of these fowls, there are now fifteen of the best known varieties of the Standard breeds in the department.

During last spring and early summer a large number of chickens were hatched by incubators and reared in brooders. In several instances most satisfactory results were obtained by means of artificial incubation. Several broods of chickens were also hatched by hens. In combination with the experience of previous years, that of the past season strengthens the opinion that where a number of chickens are required—early in the season—at one hatching, so as to be of uniform age, artificial means are preferable mediums of hatching and rearing the chickens.

During the season a temporary incubator room was erected and in it were placed five hot-air and one hot-water incubators, thus affording opportunity to compare the two systems. Several colony houses were also erected, as also a model poultry house with scratching shed attachment. This house is so arranged that the cleaning of the platform, collecting of the eggs and feeding of cut bone and mash may be done from the passage way and disturbance of the laying stock, during the winter season, so avoided.

Other useful and interesting experimental work was carried on, particulars of which will be found in the annual report of this branch.

BRANCH FARMS.

EXPERIMENTAL FARM FOR THE MARITIME PROVINCES.

At the experimental farm for the maritime provinces, located at Nappan, N.S., much useful experimental work has been continued. In the dairy branch comparative tests have been carried on to ascertain the relative merits of the individual cows composing the herd, to find out which gives the largest quantity of milk and butter fat for the feed consumed. Some further tests have also been made in the feeding of steers with the view of determining as far as possible how good beef can be produced at the least cost, also the most profitable age at which to finish off the animals for market. Experiments have also been conducted in the feeding of swine to ascertain the effect of different foods in the rapidity of growth of the animals under test.

Comparative trials have been continued with many varieties of oats, barley, spring wheat and pease to learn which are the more productive and profitable. Tests have been made with different sorts of buckwheat, also with crops of mixed grain. Different sorts of Indian corn have been tried to find what varieties give the largest weight of ensilage of the best quality. This crop has been grown in hills and rows at the usual distance, also in rows at different distances apart to find which method gives the larger crop. Some experiments have also been conducted on this crop with fertilizers. Tests have also been made with different sorts of turnips, mangels, carrots and potatoes, and much useful information gained.

Experiments have also been carried on with clover, flax, horse-beans and soja-beans.

In the horticultural division, good progress is being made. The apple orchards are doing well, and the trees are bearing good crops of fruit of excellent quality. Other

varieties of large fruits have given light yields. Small fruits on account of the drought gave an unsatisfactory return. Many sorts of garden vegetables were tried and useful information gained as to those which were the earliest, best and most productive, the particulars of which will be found in the annual report of the experimental farms.

EXPERIMENTAL FARM FOR MANITOBA.

Since wheat is the most important crop grown in Manitoba, much attention has been paid at the Brandon farm to this cereal. Experiments have been carried on with a great many different sorts of wheat with the hope of finding varieties earlier in ripening and equal in quality and productiveness to the best of the standard sorts now grown. Trials have been made with selected and unselected seed, with different methods of preparing the soil, in testing the effect of sowing with different sorts of drills; in the use of barn-yard manure and artificial fertilizers, also with remedies to prevent smut in wheat.

Many tests have also been conducted with spelt and emmer, oats, barley, pease, Indian corn, turnips, mangels, carrots, sugar beets and potatoes, with useful results.

Trials have also been made with different kinds of grasses, clovers, millets, horse-beans and sunflowers and much information gained.

Some steers were fed to determine the relative value as coarse fodder of brome hay and fodder corn cured outside in stook. Some feeding experiments with swine have also been conducted to gain information as to the usefulness of common emmer when compared with a mixture of wheat, barley and oats for fattening purposes. Experiments have also been conducted with poultry and bees.

Many further tests have been made with cross-bred and seedling apples and some useful new sorts have been fruited which promise well. Quite a large crop of the different varieties of *Pyrus baccata* and *Pyrus prunifolia* was grown with some also of the cross-bred sorts. Several good seedlings of Martha crab which appear to be quite hardy have been originated at this farm; some nice fruit was also borne on some of the *Pyrus baccata* trees which had been top-grafted with the Transcendant crab.

A number of plum trees have fruited during the past season, which were grown from selected fruit of wild plum trees found in Southern Manitoba. Most of these produced fruit which ripened early enough to escape injury from frost, and in quality they were very acceptable. Small fruits gave a fair crop and ripened well.

EXPERIMENTAL FARM FOR THE NORTH-WEST TERRITORIES.

This experimental farm usually surpasses all the others in its large crops of wheat, and the past year has been no exception in this respect, some of the varieties in field culture having exceeded 40 bushels per acre. The grain is also of good quality. Similar tests to those conducted at Brandon with wheat have been carried on here also, especially with regard to the earlier ripening habit of some of the varieties under trial. Some of the cross-bred sorts have ripened from five or six to ten or twelve days

earlier than Red Fife. If this characteristic proves to be fixed, such gains in earliness will provide for a considerable extension northward of the wheat-growing area in Canada. Much attention is paid here to the summer-fallowing of land. Care is also taken to treat the seed before sowing with a solution of copper sulphate, so that the quality of the crop may not be injured by smut.

The uniform trial plots of oats, barley, pease, Indian corn, turnips, mangels, carrots, sugar-beets and potatoes have again been grown, with, in most instances, excellent and heavy returns. Experiments have also been continued in the rotation of crops, and tests have been made with plots of fall and spring rye, flax, canary grass, tares, millets, horse beans and soja beans.

The growing of Brome grass has gone beyond the experimental stage at Indian Head, where it has been under test for the past fifteen years, and where large fields are now annually grown for hay and seed. Western rye grass has also succeeded well, and last year both alfalfa and timothy gave fair returns.

The displays of annual and perennial flowers have been unusually brilliant during the past season and have attracted much attention from visitors. The shelter belts and avenues of trees, the hedges and the plantations of ornamental trees and shrubs have grown well.

The orchards of Siberian crabs and cross-bred apples were considerably injured last winter by unusually severe depredations by rabbits, which devoured the bark of many of the trees to near the ground. This will delay the fruiting of some of these specimens for two or three years. Notwithstanding this inquiry, considerable quantities of these fruits were produced. These orchards are becoming more interesting each year.

Most of the small fruits have borne well, and the crops have matured.

A large number of different sorts of vegetables have been tested to gain information as to their suitability to the climate, and much information has been gained, which will be disseminated among farmers in the annual report of the farms.

A feeding test of steers was made to determine the effect of turning one-half of the number out each day for two hours, and comparing these with the other half kept closely confined in the stable. The steers were all fed alike. The result was slightly in favour of the animals kept in the stable.

THE EXPERIMENTAL FARM FOR BRITISH COLUMBIA.

The experimental farm for this province, located at Agassiz, 70 miles east of Vancouver, continues to render good service to the country by testing from year to year the relative productiveness, quality and time of ripening of the many products which can be grown with more or less success in this favourable climate. Experiments have been continued with many important farm crops, including oats, spring wheat, barley and pease, most of which have given good results. As at the other

farms, the element of individual productiveness in varieties asserts itself as clearly here as elsewhere, and the demonstrations made as to which of these several useful cereals give the best and most productive crops are of great value to the farmer, serving as a guide to him in his work, furnishing information which it would be impracticable for him to obtain for himself.

Many varieties of Indian corn have been tested to find out those most suitable for ensilage purposes. These have been grown both in rows and hills, and also at different distances between the rows. Many sorts of turnips, mangels, carrots, sugar beets and potatoes have also been tried. A number of fodder plants have been under test, including grasses, clovers, millets, cow peas, velvet flax, sunflowers and horse beans; experiments have also been conducted with flax and sunflowers. Most of the leading varieties of vegetables have been under trial, and particulars as to their relative time of ripening, productiveness and quality are given in the annual report of the experimental farms.

In the large collection of fruit trees which has been brought together from different parts of the world in the orchards at Agassiz, many new sorts are now fruiting every year. Careful descriptions of these are made by the superintendent as they come into bearing, and are published annually in his report. The last report contains descriptions of 49 apples, 21 pears, 10 plums and 3 cherries, all new to this climate. The information thus supplied to the fruit-growers of this province is of great value and a practical guide to them in their work. A large number of small fruits have also been tested and similar useful information supplied.

The live stock on this farm consists of Durham or Shorthorn cattle, Dorset horned sheep, Berkshire and Yorkshire swine, and several breeds of poultry. Additional animals have been supplied in each of these classes during the past year, so as to keep the quality of the stock up to the desired degree of excellence. The surplus young animals are sold to the farmers in different districts of the province for the improvement of stock.

GENERAL CROPS.

During the season of 1904 the crops in most parts of the Dominion have been encouraging. In the middle and western provinces notwithstanding that the season has been drier than usual, farmers have had favourable returns, but in the maritime provinces, owing to the severe drought which prevailed during the greater part of the growing season, most of the crops have been below the average.

ONTARIO.

In this province most of the crops have been good. Hay which is relatively a very important crop has given good average results and in some localities the crop has been unusually heavy.

Fall wheat has given in some districts a good average crop of plump and satisfactory grain, while in other localities the crop has been very light and where rust has

prevailed, the grain has been more or less shrunken. The spring wheat has also been of good quality and the yield nearly an average one. Oats which now occupy in Ontario an area larger than that of all the other cereals combined have given an excellent crop. barley has also produced very satisfactory returns. The pea crop has been somewhat reduced in acreage owing to the ravages of the pea weevil, the yield however has been satisfactory, and the injury from weevil was comparatively slight.

Indian corn was late sown owing to cool wet weather, the seed also was generally of poor quality and did not germinate well, hence in many cases there was a poor stand. The season was not hot enough to produce the best results with this crop, nevertheless in many districts a satisfactory harvest was obtained.

Potatoes generally have yielded well but have been considerably affected by rot. Wherever the vines have been sprayed at the proper time with Bordeaux mixture, rot has been prevented. Field roots notwithstanding that they were sown later than usual have given fair average crops.

Pastures have been generally good, the dairy industry has been well sustained and the exports of cheese and butter have been very large. The swine industry is also advancing and increased quantities have been available for the home and export markets.

Small fruits have given satisfactory results. Plums which gave so heavy a crop last year have yielded lightly this season. Pears are increasing in value and importance and are giving good returns. The crop of peaches has been below the average, and owing to the cool season, the later varieties of grapes did not ripen well.

Apples in most districts have yielded well, but in a few localities the crop has been light. Owing to an unusually large apple crop in Great Britain, prices for early ripening varieties have ruled unusually low, and the returns from some shipments have been disappointing. The quality of the fruit this year is good and there is every prospect that the later maturing sorts which form the larger part of the fruit exports from Canada will command good prices.

QUEBEC.

In this province hay which is perhaps the most important of all crops, has given in most localities highly satisfactory returns well above the average.

Spring wheat and barley have in general given a full average crop, while oats which in Quebec stand second only to hay in importance have given in most localities more than an average yield. Indian corn owing to late sowing and deficient vitality in the seed has given less than an average return, while vetches, clovers and other fodder crops have done well.

The potato crop has been good, but the injury from rot is considerable. Spraying at the proper time with Bordeaux mixture invariably arrests this disease. Field roots have given good returns and their growth might be extended with advantage in

this province. Buckwheat has given about an average yield, and the crop of tobacco has been fairly satisfactory.

The pastures have furnished abundant food for dairy animals and other stock. The quantity of cheese and butter produced has increased but prices have ruled somewhat lower than last year. The stock industry is progressing well, and while the animals are increasing in number they are also improving in quality much more attention is also paid to the breeding of horses.

An increasing interest is manifested in fruit growing and many new orchards have been planted. Those of sufficient age have borne well and the quality of the fruit has been quite satisfactory. In those districts where plums are grown, the crops have been good. Small fruits also gave generous returns.

THE MARITIME PROVINCES.

In these provinces the conditions for crop growing have not been so favourable as in the other parts of the Dominion. The early part of the season was cold and wet and seeding was much delayed. Shortly after the crops were up a drought occurred when scarcely any rain fell for nearly two months. Subsequent growth was rapid, but the remainder of the season was not long enough or warm enough to make up for the early loss in growth.

The yield of hay which is a most important crop in these provinces was considerably less than the average, variously estimated at from 15 to 25 per cent. Pastures also have been unusually poor.

The crops of oats, spring wheat and barley were all below the average. The quality of the grain, however, has been good. Indian corn was not a heavy crop The seed did not germinate well, which made the fields uneven and in many instances it was not well matured when frost came. Buckwheat has given fair returns.

The apple crop has been large, and the quality of the fruit good. The apple industry is attaining large proportions especially in Nova Scotia. A large number of young orchards are being planted in each of these provinces. The dry summer has been unfavourable for the crop of small fruits which has fallen below the average.

MANITOBA.

In this province the growing of cereals, especially wheat is paramount, and claims the larger share of the farmer's attention. The returns from the harvest this year are said to be below the average, due partly to dry weather in the summer and partly to rust, which in some limited areas did a considerable amount of injury. Favourable weather prevailed during the greater part of the harvesting period, and also during the time of threshing and the grain was well saved. Owing to the dry weather the growth of straw was shorter than usual which somewhat reduced the cost of harvesting. Not much of the wheat will grade No. 1, although the quality is good, but the higher price paid this season will more than make up for the somewhat reduced yield and the

slightly lower grade. The area under cereals in Manitoba is said to have been considerably increased.

Oats and barley have given fairly heavy returns, Indian corn grown for ensilage has also done well. Potatoes have given unusually large returns and the crops of field roots have been very satisfactory.

The dairy and stock interests are making good progress in Manitoba, although the pastures have been scarcely up to the average. The hay crop has been somewhat lighter than usual.

NORTH-WEST TERRITORIES.

The wheat crop in the Territories, although less in area than in Manitoba, has averaged a larger return. The dry weather injured the crop somewhat which resulted in a shorter growth of straw, but there was little or no rust and much of the grain produced was plump and good. The first autumn frost did not occur at Indian Head until the 11th of September, hence there has not been much injury from this cause. The high prices paid this year will give the farmers in the Territories large returns.

Oats, barley and pease have all done well and given crops above the average.

Potatoes have given heavy crops and the field roots have given fair returns.

The crop of hay was about medium and pastures suffered during the dry period in summer, but later in the season the growth of grass was good. Stockmen in the Territories are said to have had a prosperous season.

BRITISH COLUMBIA.

The season as a rule throughout this province was unusually dry. This did not materially injure the farms in the coast climate where the usual rainfall is very heavy, but it reduced the crops in the interior where the rainfall is scanty and irrigation is not practised. On irrigated lands the crops were good.

Hay, in most parts of the coast climate, was an exceptionally heavy crop. Clovers succeeded remarkably well and gave in most instances two good crops and in some cases three.

Oats, spring wheat, barley and pease have all given satisfactory returns except in some of the drier districts referred to and the grain is plump and good.

Potatoes have given somewhat less than an average yield, but field roots in most instances have given good returns. Indian corn has also grown well, but was uneven owing to faulty germination of the seed.

Hops have given a large crop and the quality is very good. Most of the growers in British Columbia find a good market for their product in Great Britain.

Apples have given an average yield, and in some orchards in the interior the crop has been heavy. The fruit was of excellent quality and commanded good prices. Pears

also have produced fair crops and given good returns. A large crop of plums was harvested, and were less injured by rot than usual; a large proportion of these found a ready market in the mining districts in British Columbia and in the North-west. Cherries also in some districts were a satisfactory crop.

Small fruits yielded abundantly, blackberries being especially productive.

HEALTH OF ANIMALS BRANCH.

Considerable progress has been made in the reorganization of the health of animals branch of my department.

New quarantine regulations, providing for the more effective inspection and quarantine of imported animals, have been issued.

Provision has also been made for the erection of new animals quarantine stations at Halifax and St. John, at the former place by purchase of a suitable parcel of ground, and at the latter by securing a lease of an equally suitable property from the Department of Railways and Canals.

At both of these ports it will now be possible to directly transfer imported animals by rail from the ship to the quarantine station.

A number of new quarantine stations have also been established along the boundary between Canada and the United States, as I have found it advisable to adopt quarantine measures in the case of certain classes of animals imported from that country.

Owing to the prevalence of glanders, especially in the North-west Territories and in some parts of Ontario and Quebec, and the appearance of another serious disease of horses in Alberta, I found it necessary to introduce an amendment to the 'Animal Contagious Diseases Act,' authorizing payment, in certain cases, of compensation for horses destroyed. I anticipate great benefit from this change of policy, as it will enable the officers of this branch of my department to deal with outbreaks of disease in a much more thorough and effective manner than has hitherto been possible.

Mange having continued to affect to a serious extent the cattle of Southern Alberta and a considerable portion of Assiniboia, a comprehensive policy providing for their general and simultaneous treatment was adopted in the early part of last summer. This policy, which has involved a considerable extra expenditure owing to the necessity for thorough organization extending over a large area, has been carried out with a gratifying measure of success, nearly 500,000 head having been subjected to treatment during the months of September and October.

As above mentioned, a new disease known as dourine, or 'Maladie du Coit' has made its appearance among the horses in Southern Alberta. This disease was originally imported from Europe to the United States in 1882, and having since existed in various parts of that country, has doubtless been introduced among the large importations which have accompanied the recent influx of settlers. Active steps have been

taken to prevent its spread, and at the present time a number of horses are isolated in a temporary quarantine at Lethbridge, Alberta, where they are being kept under close observation with a view to the destruction of all individuals developing unmistakable symptoms. As the disease is not thoroughly understood, especially in America, where climatic and hygienic conditions are not favourable to its active development, it has been thought better to follow this course than one of indiscriminate slaughter.

The results so far of the investigation into the nature and cause of 'Pictou Cattle Disease,' which is being conducted at the recently established experiment station near Antigonish, N.S., encourage me to hope that this malady may soon be shown to be due to local causes instead of being, as has long been feared, of a contagious nature.

The investigation being conducted at Winnipeg into the nature and causes of the disease of horses known as Swamp Fever' is still being carried on, but owing to lack of material the progress made cannot be considered satisfactory. The disease, however, is not nearly so prevalent as in former years, a result probably due to the settlement and drainage of large areas of swamp land.

The biological laboratory recently established at the experimental farm, is demonstrating its usefulness in several directions. Many pathological specimens forwarded by our inspectors and others, have been examined and doubts as to the nature of outbreaks of disease in various parts of the country have thus been set at rest.

Among other matters, the pathologist has examined a number of cases of lump jaw, with the result that he has been able to show that many animals supposed to be suffering from actinomycosis are in reality affected with actinobacillosis, a disease similar to the former malady in its external manifestations, but differing widely in pathological character.

The mallein used by the department in diagnosing and dealing with glanders, is now produced at this institution instead of being purchased from manufacturers as formerly. It is hoped that in the near future, a number of similar preparations will also be produced.

The results of the active policy now followed in dealing with hog cholera have been most gratifying, the number of outbreaks reported during the present year being considerably less than one half of those for the corresponding period immediately preceding. With the exception of a few minor outbreaks in British Columbia, the disease has been practically confined to the quarantined area in south-western Ontario, where the efforts of our inspectors have been instrumental in lessening to a marked degree the prevalence of the disease.

The system now in force of following up and thoroughly cleansing and disinfecting all stock cars conveying hogs from the quarantined area is, I am satisfied, responsible in a marked degree for the noteworthy diminution of outbreaks in other districts.

The application of similar rules to all cars conveying animals from the mange-infected area in the North-west Territories and the providing of separate yards for

their accommodation will, I am convinced, be found equally effective in preventing the spread of that troublesome disease. It has long been contended by western stock men that mange was being constantly introduced among their herds by the importation of stockers from Manitoba and Ontario, in spite of the fact that this disease does not exist in these provinces, the fact being that the young animals contracted mange through being conveyed in cars and held in yards previously occupied by animals shipped from the infected area.

The new regulations now in force are calculated to put an end to this unsatisfactory condition of affairs.

There has been, during this year, a gratifying diminution in the number of outbreaks of anthrax and black quarter. The dissemination of useful information regarding these diseases, particularly as to the thorough destruction of carcasses has been of great benefit.

Tuberculosis also appears to be much less prevalent than in former years.

The returns with reference to sheep scab are most encouraging, very few outbreaks having been reported, although the machinery for their detection is more effective than was formerly the case. The policy which was adopted last year of carefully watching the large live stock markets has been fully justified by results, a number of outbreaks of disease having been detected and dealt with through information obtained in this way by our inspectors.

The export to Europe of cattle and sheep has been carefully guarded, a distinct improvement having been made in this direction by the adoption of a policy of carefully examining all stock shipped from Canada viâ United States seaports.

ARCHIVES BRANCH.

For some years past, the government has had under consideration a scheme for centralizing the records of the Crown. In 1903, an Order in Council was passed, by which it was provided that all papers deposited in the various departments, affecting the earlier history of the country, should be transferred to a central office and placed in the custody of an individual, to be named the Dominion Archivist and Keeper of the Records. The papers to be thus transferred include:

1. Everything in the archives branch of the Department of Agriculture.

2. Everything in the records branch of the Department of the Secretary of State, other than departmental files and letter-books of later date than June 30, 1867, lodged there for convenience.

3. Everything in the Privy Council Office of date anterior to July 1, 1867.

4. Correspondence of the Provincial Secretary of Canada in the Department of Finance and elsewhere.

5. Papers in the Militia Department, or elsewhere, having reference to the War of 1812 and the Rebellion of 1837.

6. Documents bearing upon the early history of the Rideau and Welland canals, whether in the Department of Railways and Canals, or in the Department of the Interior or elsewhere.

7. Documents in the Department of Justice, or elsewhere, relating to the risings in the North-west, and also those touching the Fenian Raids.

8. Bound manuscript volumes containing reports of Indian commissioners at Albany and elsewhere, dating from 1722, now in the Department of Indian Affairs; also the original surrenders from the Indian tribes.

9. Papers in the Department of Marine and Fisheries, relating to the Behring sea seal fisheries and other international questions, as the subjects to which they relate are disposed of.

The archivist will, therefore, become the custodian of records which have hitherto been under the control of the various departments.

An estimate of the space required for the reception of these records was obtained, and it was found that a building affording a floor space of 20,000 square feet would be necessary. The government thereupon decided to erect a suitable fire-proof building for the preservation of the archives, and the work has been commenced.

In the meantime, it has been found necessary to remove about 400,000 records from the Department of the Secretary of State, and several cases from other offices, to a temporary building. The total number of records to be deposited in the central office will be very large. Many of them are of special value and absolutely necessary for the correct interpretation of our history. The work of arranging and classifying these records will entail considerable labour, and it will be desirable to make provision for means to carry on the work with reasonable promptitude.

The Archives Branch has been placed under the charge of A. G. Doughty, Fellow of the Royal Historical Society, Doctor of Letters of the University of Laval, and formerly joint librarian of the legislature of the province of Quebec. For many years Dr. Doughty has been actively engaged in research, and has kept in touch with the custodians of records in England and in foreign countries.

Since his appointment the archivist has made good progress with the work of reorganization. A general index to the contents of all the volumes at present is in the course of preparation, and will be completed within a few months. Further details of the work undertaken, and of the condition of the records, are to be found in the Archivist's Report for the present year. I am pleased to announce that so far his efforts have been successful, and that he has secured for our archives about 400 volumes of original papers, consisting of despatches from the Secretary of State in England, to the Governors in Canada, between 1790 to 1840 ; correspondence between the Governors and the lieutenant governors of the provinces, and many cases of semi-private documents bearing upon Canadian history.

During the past year the department has received the following volumes :

FROM LONDON.

Nova Scotia—

Despatches to Governors and Acting Governors, 1750-1763.
Expedition to Louisburg, 1745-1750.
List of Emigrants, 1748-1749.

Cape Breton—

Despatches to Governors, 1784-1790.
Minutes of Executive Council, 1785-1798.

Prince Edward Island—

Journals of the House of Assembly, 1776-1801.
Journals of the Legislative Council, 1773-1801.
Minutes of the Executive Council, 1784-1798.

From Paris—

Canada Correspondance Générale, 2ème Séries.
Domaine d'Occident, 1739-1748.
Mémoire du Roy et Lettres Ecrites, 1709.
Inventaire des Ecrits, 1718.
Arrêts et Décisions, 1677-1731.
Etat Civil, Ile St. Jean, 1721-1751.
Recensement de l'Acadie, 1671-1752.

III.—PATENTS OF INVENTION.

The following comparative tables show the transactions of the Patent Branch of the Department of Agriculture, from November 1, 1894, to October 31, 1904 :—

Years.	Applications for Patents.	Patents and Certificates Granted.			Caveats.	Assignments of Patents.
		Patents.	Certificates.	Total.		
1894	3,291	2,756	462	3,218	301	1,445
1895	3,387	3,074	422	3,496	343	1,550
1896	3,728	3,488	413	3,901	306	1,420
1897	4,300	4,013	284	4,297	377	1,551
1898	4,200	3,611	262	3,873	363	1,657
1899	4,305	3,151	412	3,563	311	1,467
1900	4,628	4,522	482	5,004	283	1,914
1901	4,817	4,766	551	5,317	302	2,323
1902	5,301	4,391	510	4,901	317	2,339
1903	5,912	5,673	432	6,105	328	2,384
1904	6,061	6,691	517	6,607	303	2,472

DETAILED STATEMENT, Patent Office Fees.

Years.	Patents.	Assignments.	Caveats.	Copies.	Subscription to 'Patent Record.'	Notices to Apply for Patent.	Sundries.	Total.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1894.....	73,061 77	3,142 74	1,793 40	764 07	347 21	1,449 80	123 57	80,682 56
1895.....	78,223 52	3,194 00	1,854 35	761 54	245 98	1,951 30	129 79	86,358 48
1896.....	85,060 61	3,130 56	1,790 65	898 27	420 60	2,245 79	57 04	93,532 52
1897.....	93,298 16	3,250 23	2,108 57	969 33	252 53	2,110 89	128 21	102,117 92
1898.....	91,176 44	3,641 90	1,935 74	706 50	266 44	1,463 10	172 73	99,361 95
1899.....	98,669 92	3,781 71	1,533 25	1,028 80	198 65	1,912 00	137 83	107,261 56
1900.....	104,848 96	4,255 40	1,405 00	932 54	552 71	1,742 70	115 15	113,852 46
1901.....	109,985 59	4,506 07	1,479 25	882 87	592 47	2,484 90	133 22	120,064 37
1902.....	119,766 43	5,079 20	1,565 35	1,112 59	327 95	1,883 00	162 30	129,896 82
1903.....	130,561 00	5,309 00	1,803 00	1,067 82	373 75	1,994 25	254 99	141,363 81
1904.....	134,676 47	5,831 10	1,660 44	1,201 08	391 75	1,827 25	308 01	145,896 10

The Patent Office fees received during the year ended October 31, show a surplus of $83,266.94 over the working expenses of the office as per subjoined table.

Receipts.	$ cts.	Expenditure.	$ cts.
Cash received.....	145,896 10	Salaries.....	42,315 50
Cash refunded.....	2,933 42	'Patent Record'.....	17,380 24
			59,695 74
		Receipts over expenditure.....	83,266 94
Net cash.....	142,962 68		142,962 68

The following is a table of the countries of residence of the patentees for the years named :—

Countries.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	1903.	1904.
Canada	661	707	740	756	710	601	707	744	654	794	837
England	177	179	215	266	261	205	254	256	239	248	310
United States	1,731	1,980	2,270	2,666	2,312	2,038	3,216	3,423	3,164	4,222	4,417
France	24	21	24	26	39	36	40	50	45	57	65
Germany	108	102	117	126	124	112	157	125	100	116	185
Other countries	55	85	122	173	165	159	148	168	189	236	277
Total	2,756	3,074	3,488	4,013	3,611	3,151	4,522	4,766	4,391	5,673	6,091

The Canadian patentees were distributed among the provinces of the Dominion as follows :—

Provinces.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	1903.	1904.
Ontario	404	451	430	464	383	310	396	407	373	438	477
Quebec	162	177	201	178	171	160	164	185	148	194	171
New Brunswick	13	13	12	20	26	7	14	26	14	18	33
Nova Scotia	15	19	32	22	27	18	21	17	26	22	35
Prince Edward Island	2	6	2	2	4	8	1	0	1	2	1
Manitoba and the North-west Territories	38	18	28	36	45	50	42	52	40	64	61
British Columbia	27	23	35	34	54	48	69	57	52	56	59
Total	661	707	740	756	710	601	707	744	654	794	837

Patents issued to residents of Canada, with the ratio of population to each patent granted :—

Provinces.	Patents.	One to every
British Columbia	59	3,028
Ontario	477	4,568
Manitoba and North-west Territories	61	7,654
Quebec	171	9,631
New Brunswick	33	10,034
Nova Scotia	35	13,131
Prince Edward Island	1	103,259
Total	837	

Statement of the number of patents issued under the Act of the session of 1892, 55-56 Vic., chap. 24, on which the fees are paid for periods of six, twelve or eighteen years, at the option of the patentee; and of patents on which certificates of payments of fees were attached after the issue of patents originally granted for periods of six and twelve years.

Years.	Periods for which the Fees were paid on first issue.			Patents on which Certificates were attached after issue.	
	6 years.	12 years	18 years	6 years.	12 years
1894 (12 months ended October 31)	2,701	9	46	.....	4
1895 " "	3,049	5	20	.....	.....
1896 " "	3,443	11	34	2	.....
1897 " "	3,981	8	24	15	3
1898 " "	3,586	3	22	176	9
1899 " "	3,125	3	23	291	13
1900 " "	4,489	4	29	366	21
1901 " "	4,719	8	39	408	31
1902 " "	4,362	2	27	412	39
1903 " "	5,630	2	41	405	27
1904 " "	6,059	9	23	493	24

The preceding tables show that there has been a large increase in the transactions of the Patent Office during the past year. The total revenue for the year ended October 31, 1904, was $145,896.10, exceeding all previous years; resulting in an in-

crease of $4,532.29 over the preceding year, and a surplus of $83,266.94 over the expenditure.

The total number of reports issued by the examiners during the year was 8,347.

Out of the total number of patents granted during the year, there were 4,417 issued to inventors resident in the United States, being over 74 per centum of the whole issue.

Patentees who are resident in foreign countries, continue to avail themselves of the privilege granted under section 8 of 'The Patent Act,' by giving notice of intention to apply for patents in Canada. The number of these notices registered during the year was 919, yielding a revenue of $1,827.25.

The 'Canadian Patent Office Record' continues to be published monthly. It contains a transcript, with drawings, of all claims of patents granted, dates of filing, dates of issue, and length of term for which fees have been paid; also names and residences of patentees, as well as containing a list of registered copyrights, trade marks and designs. This publication is of great and increasing value to all who are interested in patents, trade marks, copyrights and designs. It affords convenient and easy reference to the claims of all patents granted in Canada, and thus enables both inventors and the public to see exactly what is patented.

This publication is supplied to foreign patent offices, and is also sent without charge to the free libraries in Canada, and in foreign countries, with the object of diffusing in the public interest the information therein contained. The publication is also furnished to the public at $2 per annum, or 20 cents for single monthly numbers.

This branch of my department is indebted to the British and United States Patent Offices, for their weekly official reports.

I have again to direct the attention of patentees and their solicitors, to the necessity of remitting partial fees before the expiry of the six and twelve years' terms, otherwise the patents will cease and determine, the Commissioner not being vested with the discretionary power, under any circumstances, to revive them. A revival can only be secured by a private Act of Parliament, the obtaining of which entails considerable expense to the patentee. It may further be added that the Committee on Private Bills usually discourages applications of this kind, on the ground that no one should be denied the right of manufacturing, using or vending an invention which has become the property of the public. Exceptional cases may arise, however, in which the patentee or the holder of the patent may be justly entitled to relief from parliament.

It is in the interest of both the applicants and the office that great care should be taken by applicants and their attorneys in the preparation of the papers and drawings which are required by the rules and forms.

Since the Act of 1903, amending the Patent Act, came into force a very large number of applications have been received from patentees to have their patents made

subject to these conditions. In dealing with these applications the requirement of the law in regard to manufacture has been kept in mind. The applications which have been granted are those relating to patents for inventions such as the following : An art or process; improvements on a patented invention when both patents are not held by the same person; appliances or apparatus used in connection with railways, telegraph, telephone and lighting systems, and other works usually under the control of public or large private corporations, and which appliances or apparatus cannot be installed or constructed without the consent of such corporations; and certain inventions which are manufactured or constructed only to order, and are not, according to custom, carried in stock.

In dealing with applications for extensions of time to manufacture and import, the law is applied according to its strict and literal meaning, and the applications are granted only when the applicant has clearly established to the satisfaction of the office, by affidavit or solemn declaration, that the failure to manufacture or import is due to no fault of his, but to reasons beyond his control. Although these applications continue to be quite numerous, it is seldom that such a case is made out as warrants the granting of the application.

The regular work of this branch of my department during the year has been attended to with as much despatch as possible, and I am pleased to say that the number of applications unavoidably in arrears in the examiners' divisions has been greatly reduced.

IV.—COPYRIGHTS, TRADE MARKS, INDUSTRIAL DESIGNS AND TIMBER MARKS.

STATEMENT of fees received by the Copyright and Trade Marks Branch from November 1, 1903, to October 31, 1904.

Months.	Trade Marks.	Copyrights.	Designs.	Timber Marks.	Assignments.	Copies.	Total.
1903.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
November	1,213 75	93 00	35 00	6 00	18 00	6 00	1,371 75
December	1,400 00	192 00	55 00	8 00	14 00	21 50	1,690 50
1904.							
January	1,341 15	72 35	21 00	6 00	16 50	9 00	1,466 00
February	1,960 35	73 00	35 00	6 00	5 00	12 00	2,091 35
March	2,095 25	94 50	65 00	.....	8 75	4 20	2,267 70
April	1,375 00	96 00	95 00	2 00	34 00	24 75	1,626 75
May	1,826 00	120 50	124 00	4 00	19 00	23 00	2,116 50
June	1,290 60	119 00	95 00	.....	13 00	3 50	1,521 10
July	1,639 90	114 00	15 00	4 00	8 00	20 65	1,801 55
August	1,435 35	113 50	43 00	4 00	23 00	16 50	1,635 35
September	1,377 15	89 50	38 00	8 00	20 00	8 50	1,541 15
October	1,295 10	124 00	65 00	.....	25 00	8 50	1,517 60
	18,249 60	1,301 35	686 00	48 00	204 25	158 10	20,647 30

The following table shows a comparative statement of the business of this branch from 1894 to October 31, 1904, inclusive :—

Year.	Letters Received.	Letters Sent.	Copyrights Registered	Certificates of Copyrights.	Trade Marks Registered	Certificates of Trade Marks.	Industrial Designs Registered	Certificates of Industrial Designs	Timber Marks Registered.	Certificates of Timber Marks.	Assignments Registered	Fees Received.
1894	1,882	2,720	546	216	311	311	39	39	20	20	77	9,463 63
1895	2,184	3,279	601	163	374	374	52	52	20	20	70	11,673 26
1896	2,185	3,437	653	212	331	331	68	68	14	14	161	10,579 54
1897	2,606	3,548	756	273	446	446	75	75	13	13	94	14,101 93
1898	2,576	3,453	734	275	423	423	136	136	15	15	114	13,535 17
1899	2,487	2,910	702	237	430	430	112	112	5	5	117	14,161 28
1900	2,679	3,213	893	247	447	447	126	126	22	22	136	14,782 53
1901	2,605	3,211	888	249	521	521	146	146	24	24	183	16,823 26
1902	2,687	3,257	900	196	528	528	164	164	26	26	222	17,703 09
1903	2,687	3,211	900	176	557	557	88	88	23	23	272	18,086 25
1904	2,858	2,793	1,106	228	621	621	107	107	25	25	118	20,647 30

The total number of registrations of copyrights, trade marks, industrial designs and timber marks, including registrations of assignments, was 2,021, during the year ended October 31, 1904. This consisted of 1,106 registrations of copyrights, 621 registrations of trade marks, 107 of industrial designs and 25 of timber marks. There were also issued 214 certificates of copyrights, 44 registrations of interim copyrights, and 12 certificates, 8 registrations of temporary copyrights, and 2 certificates. The total number of assignments of these different rights recorded was 118.

The correspondence of this branch of the department amounted to 2,858 letters received; 2,793 letters sent.

The amount of fees received during the year, as certified by the accountant, amounted to $20,647.30.

V.—PUBLIC HEALTH AND QUARANTINE.

The threatenings of bubonic plague, cholera and smallpox, mentioned in my last annual report, have continued in this quarantine year.

The continuation of strict precautionary measures, ordinary and special, for the sanitary protection of the country has, therefore, been necessary.

The continued public demand for governmental recognition of the importance of hygiene and preventive medicine, referred to in my last annual report, is instanced by the fact that I am in receipt of a copy of a resolution, adopted by the Canadian Medical Association at its annual meeting, at Vancouver, B.C., in August last, again

pressing upon the consideration of the government the expediency of creating a department of public health under one of the existing ministers.

Circulars of warning and instruction have been issued from time to time, as the threatenings of disease on both our coasts and on our frontier seemed to require.

The exemption from routine inspection, on the Atlantic side, of vessels arriving from New York and ports north thereof—provided for in section 9 of the regulations—and usual in healthy years—was resumed this year, owing to the practical cessation of the existence of smallpox as an epidemic in the New England and contiguous States.

On the Pacific side, inspection of all vessels from San Francisco has been maintained throughout the year, on account of the threatening of bubonic plague from that city. As, however, no case of the disease has been reported in that city since March 1 last, I have it under my consideration whether these inspections may not soon be again suspended.

Extra coast and frontier inspections were instituted or continued by me for shorter or longer periods, as seemed to be required, at the following places:—In Nova Scotia, Louisburg, Yarmouth and Canso; in New Brunswick, McAdam Junction, Edmundston, Houlton (Debec Junction) and St. Stephen; in Prince Edward Island, Georgetown; in Ontario, Sault Ste. Marie and Rainy River; in Manitoba, Sprague, Morden, Crystal City, Killarney and Deloraine; and in British Columbia, Rossland, Grand Forks and Greenwood; and vessels from the north were specially inspected at British Columbia ports during an outbreak of smallpox in Alaska. And those arriving at Charlottetown and Georgetown, P.E.I., were specially inspected during an outbreak of that disease in Cape Breton.

In addition to the officers holding the above-mentioned posts, Dr. James Patterson, of Winnipeg, has continued to act for me in the management and suppression of smallpox in the North-west Territories. So well has this been done, that there is now no case of that disease in the Territories, nor has there been for the last ten weeks.

Owing to the continued increase in the shipping coming to Louisburg, in Cape Breton, that port—heretofore an unorganized maritime quarantine station—was created a regular quarantine station by Order in Council dated January 8 last. A permanent medical officer has been appointed in charge.

The bubonic plague claimed victims from time to time in San Francisco since my last report. There have been during that period twelve cases reported, with eleven deaths. The last case reported was on March 1 last. The summary since the disease was first reported is: calendar year 1900, 22 cases, 22 deaths; 1901, 30 cases, 25 deaths; 1902, 41 cases, 41 deaths; 1903, 17 cases, 17 deaths, and 1904, to date, 9 cases, 8 deaths. Total, 119 cases, 111 deaths.

This disease has occurred during the year in South Africa, Australia, Brazil, Chili, China, Egypt, Formosa, Hawaii, India, Japan, Mauritius, Peru, Philippine Islands, Turkey, and in San Francisco.

Cholera has prevailed during the year in Afghanistan, Borneo, China, Formosa, France, India, Japan, Persia, Philippine Islands, Russia, Straits Settlements, and Turkey.

Yellow Fever.—Later researches and reports only serve to confirm all health authorities in doing battle with the mosquito, *Stegomyia Fasciata.* In Havana, Cuba, no case of yellow fever has originated since September, 1901, since which time the city has been entirely exempt from the disease, that had there kept stronghold for at least a century and a half. Cases are now admitted into Havana from Mexican ports, but are treated under screens with perfect impunity, in the ordinary hospitals. The crusade against the insects has also caused a large decrease in malarial fevers.

Smallpox has again prevailed world-wide during the year. It continued to threaten us on the Atlantic and Pacific coasts, and along our international frontier. The epidemic of this disease which has been present for the last four years in the United States seems now to be nearing its end.

The diseases which have been brought to my maritime quarantine stations, during the year, are: smallpox, diphtheria, scarlet fever, measles, chickenpox, enteric fever, and beri-beri.

In not a single instance during the year did any one of these diseases gain an entrance through any of my organized quarantine stations. My frontier inspections were also very efficient in protecting the public health of the country with the least possible interference with trade and travel.

In order that vessels shall not be unduly detained and hampered by imperfect appliances at my maritime quarantines, I am endeavouring as far as possible to move *pari passu* with the advances being made by the modern passenger steamship business. The large open steerages are being replaced by small compartments, and coal oil light has been almost universally superseded by electricity. Similar changes are being pushed at my stations. Large detention sheds heretofore all in one room, at Grosse Isle, and at Halifax, have been subdivided into small compartments. At Grosse Isle and at William Head electric lighting has been installed and works well. At Partridge island, St. John, N.B., the acetylene gas is being installed. At this latter station also steps have been taken to ensure a good water supply from the city mains, and, in view of the ever increasing business of the port, to erect more detention houses for those who have to be kept under observation, and a proper winter hospital. A deep water wharf here as at Grosse Isle will be requisite before the station can be considered as thoroughly equipped. Provision has been made in this year's estimates for the commencement of the extension of the Grosse Isle wharf into deep water. A new large steam disinfector has been installed at William Head, B.C., and a small one arranged for at the Tracadie Leper Lazaretto. The new station at Louisburg will require at least the minimum equipment of wharf, disinfector and hospital on approximately the same scale as those at Sydney, C.B.

LEPER LAZARETTO, TRACADIE, N.B.

The State of Louisiana, U. S., has recently erected a lazaretto for lepers, and an expert of the United States Public Health and Marine Hospital Service has pro-

nounced it 'the equal of any hospital for lepers in the world, and superior to all in equipment and the method of treatment, except that of Tracadie, province of New Brunswick, Canada.'

Details of this year's work at my different stations, at the Tracadie Leper Lazaretto in the North-west Territories, and under the Public Works Health Act, will be found in the reports of my officers annexed hereto.

VI.—STATISTICS.

The Statistical Division of the Department of Agriculture is based upon the Union Act of 1867, which specifically assigns Census and Statistics to the exclusive authority of the Parliament of Canada.

In accordance with this assignment of duties, the Dominion Parliament passed chap. 21 Acts of 42 Victoria.

In the Revised Statutes of Canada, 1886, this Act forms chaps. 58 and 59. Chap. 60 is the authority for the collection of criminal statistics.

Chap. 59, Revised Statutes of Canada provides (1st section) for the collecting, abstracting, tabulating and publishing of vital, agricultural, commercial, criminal and other statistics by the Department of Agriculture.

The fourth section gives the Minister of Agriculture power to arrange with any Lieutenant Governor in Council, or with any provincial organization for the collection and transmission of information collected under provincial systems.

The fifth section says:—

'The Minister of Agriculture may, in collecting statistics in the manner provided by this Act, call upon any and all public officers to furnish copies of papers and documents and such information as lie respectively in the power of such officers to furnish with or without compensation for so doing, as is regulated, from time to time, by the Governor in Council.'

The sixth section provides for the publication of an abstract and record of the various departmental or other public reports and documents.

The seventh section gives power to the Governor in Council to authorize the Minister of Agriculture to cause special statistical investigations as regards subjects, localities or otherwise to be made.

The eighth section empowers the Minister of Agriculture to cause all statistical information obtained to be examined, and any omissions, defects, or inaccuracies discernible therein to be supplemented and corrected as far as possible.

The ninth section is as follows:—

'Every one who wilfully gives false information or practices any deception in furnishing information provided for by this Act shall, on summary conviction before two justices of the peace, be liable to a penalty not exceeding one hundred dollars.'

By another section of the Act, the Governor in Council is empowered to appoint temporary clerks or employees for an indefinite period.

The evident aim and intention of these several Acts is the establishment of a Bureau of Statistics, which shall form part of the Department of Agriculture, and in which shall be consolidated the general statistics of the country, the officers in charge of which shall have every facility necessary to enable them to obtain the needed statistics from the several departments of the federal government, and of the provincial governments, or by special statistical investigations.

A general collection and issue of Dominion government statistics by the statistical division, as directed by the statute, would establish uniformity, coupled with increased accuracy and large economy in compilation.

The statistical division has collected during the year material to enable it to provide a system for collecting agricultural statistics throughout the Dominion supplementary to the system employed in some, but not all, of the provinces. If a good plan insuring accuracy and early publication could be adopted in Canada, the value to farmers and business men of this information can hardly be over-estimated. The crop reports of the United States, going over all Europe monthly, are a good advertisement of the agricultural possibilities of the country, while an early knowledge of the actualities gives to growers and dealers an advantage, in connection with output and prices, which is of direct pecuniary value.

The frequency with which applications are made to the statistician for information about the crops of Canada, coming as these applications do both from within the Dominion and from outside countries, suggests the advisability of establishing in the near future a statistical inquiry dealing with crops, prices, cost of transportation and like matter.

A great increase in the number of applications for statistics is one feature of the year's experience.

The greater interest taken in Canada is seen in this increased demand.

Annual publications of many countries call for statistics of Canada to a much larger extent than in former years. The number of the list is so great as to make large demands on the time of the officers of this division.

The usefulness of this branch of my department is illustrated by the following letter :—

OFFICE OF EMPLOYERS' ASSOCIATION,
TORONTO, December 23, 1903.

SIR,—I cannot express to you how much we appreciated your kindness in sending such a thorough account of the cost of living in connection with the arbitration matter that I wrote you of in November. I am pleased to say that in view of the splendid information that we were able to put forward that the arbitration was amicably settled and the strike, which might have proved a very embarrassing one, was averted.

The arbitrators desire me to convey to you their very heartiest thanks for the care that was displayed in picking out the salient points that bore directly upon the ques-

tion in issue. I may have occcasion from time to time in arbitration matters of again asking your assistance, and I trust that you will overlook the trouble occasioned in the general benefit to the workingmen of this city.

Thanking you again,

I am,

Yours very truly,

(Signed) JAMES G. MERRICK,

Secretary.

HEALTH STATISTICS.

No steps have been taken as yet to provide a better system of collecting vital statistics than that which was abolished in 1891.

In the province of Ontario, Quebec, New Brunswick, British Columbia, Manitoba and the North-west Territories, the provincial and territorial authorities have placed on the statute-books Acts dealing with the collection of vital statistics. Section 4 of chap. 59, Revised Statutes of Canada, already quoted, gives the necessary legislative authority to enable my department to join the provincial authorities in making arrangements for the better collection of different kinds of statistics, without limiting the power of my department to enter upon provincial fields not worked by provincial organizations. By a combination of forces the result would be more satisfactory than by any other system that could be originated by the federal authorities. Instead of clashing statistics there would be statistics having a joint approval.

CRIMINAL STATISTICS.

The detailed analysis of these statistics which has accompanied in former years the general report of the department will be found this year, as in the last two years, in the introduction of the special report on crime published as a separate blue-book.

A few salient points may be given.

The number of charges, in 1903, for indictable offences was 9,622, and the number of convictions was 6,521. The percentage of convictions to charges is : 1903, 67·77 per cent; 1902, 66·22 per cent, 1901, 68 per cent; 1900, 68·51 per cent and 1899, 69·22. The year 1903 shows an improvement upon 1902, but the proportion is still below what it ought to be, though it is satisfactory to note that apparently the references in last year's report to this defect have been productive of good.

In England and Wales the percentage of convictions to charges is 81·3 per cent ; in Scotland 82·80 per cent, and in Ireland 65·3 per cent.

Analysis by provinces shows that with the exception of the province of Quebec all the provinces are below the Scotch and English standards, Quebec having for a period of nine years an average of 84·82 per cent, a figure approached by no other province.

In the year 1903, New Brunswick has the poorest record, 36 charges in every 100 failing to result in conviction ; Ontario has 35 failures in each 100. I suggest care-

ful study, by the judiciary of the country, of the situation with a view to discover the reasons for such a gap between charges and convictions as the statistics show.

This is the more necessary because in some of the provinces this gap between charges and convictions seems to be widening with the years. Thus in Nova Scotia 81·85 per cent of the charges in 1895 resulted in convictions. The next year gave 81·34 per cent ; the next gave 80·20, with 1902 at 65·83 and 1903 with 66·07 per cent, a slight improvement in 1903 compared with the previous year but serious deterioration compared with the percentage of 1895.

Ontario has for many years had a low percentage of convictions, that of 1895 being 65·10; of 1899, 64·84 and of 1903, 64·80, showing that low as was the proportion in 1895 the trend has been to still lower percentages.

The aim of all the provinces should be to attain the high percentage reached in the province of Quebec. A careful study of the methods pursued in Quebec might result in great improvement in the other provinces.

The number of convictions under the two heads of indictable offences and summary convictions in 1903 was 50,383, an increase of 6,847 compared with 1902. This increase is divided into 861 indictable offences and 5,986 summary.

Of the 50,383, there were 6,521 convictions under the head of indictable offences and 3,042 acquittals. There were 15 detentions for lunacy, an increase of 4 over the previous year and indicating a general increase in lunacy supported by the Census of 1901, which showed that the unsound of mind increased over 23 per cent in the ten years. The indictable convictions in 1903, compared with 1902, show a decrease in Prince Edward Island, Nova Scotia, New Brunswick, Ontario, and British Columbia, and an increase in Quebec, Manitoba and the Territories and Yukon.

With respect to sex in crime, the record of the indictable convictions of 1903 gives emphasis to the conclusions of last year, viz.: that girl criminality shows a relative decrease ; that between the ages of 16 and 21 there has been for 1901-3 an increase in the number of women committing crime as compared with 1895-7 and 1898-1900, that for women of mature years the records show a decrease, and that there is a steady increase in the number of women who do not know their ages.

This latter fact indicates in a general way an increase in the ignorant criminals of the country.

Under the heading of indictable offences, class III. includes offences against property without violence and in this class are included such crimes as embezzlement, fraud, &c. Under these sub-divisions 24 women were convicted in 1903 against 16 in 1902. The chief subdivision is larceny from the dwelling and from the persons and larceny of letters. As revealing the besetting sin of women criminals of Canada, the records show that of the convictions of women for all kinds of indictable offences nearly two-thirds are for larceny. There are 404 convictions of women for indictable offences in 1903, and 263 of these were for stealing.

The tables which have been prepared for the detailed report show that the eastern or maritime provinces have fewer women convicted of the crime of stealing than their proportion of women warrants ; that in the province of Quebec the women convicted of stealing are about equal to their proportion of the total population ; and that the province of Ontario stands alone in having a larger proportion of its women convicted stealers of property. Ontario has 41·47 women in every 100 women of the Dominion ; it has 56·74 per cent of the women convicted of stealing.

In dealing with stealing by women the courts of Quebec province stand at the head of all the provinces. There were 718 charges of theft by women brought before the courts in 1903, with the result that 650 were convicted, over 90 per cent. Manitoa alone of the other provinces approached the Quebec standard, having 80 per cent of the 107 women charged, in the convicted column.

The total convictions for larceny by both sexes in 1903 were 3,316 and in 1902, 3,104. Convictions of women for this crime were 12·2 per cent of the whole in 1903 and 16·98 per cent for 1902, thus proving that women formed a larger proportion of the stealers.

RURAL AND URBAN CRIME.

The returns for 1903 covering the indictable misdemeanours of both males and females show that over 70 per cent of the persons convicted of indictable offences are residents of cities and towns. The 'not given' being, for 1903, 734 cases, renders it difficult to obtain satisfactory conclusions. The increase—232—suggests less care on the part of those whose duty it is to obtain these details. I cannot too strongly urge upon the officers of the courts that the value of these statistics is immeasurably enhanced by the careful filling in of the forms distributed by my department.

The same laxity is evident in the returns of occupations. These were not filled in in 2,464 cases in 1903 compared with 1,731 cases in 1902. Possibly the fact that 'occupation' was left blank in so many more cases is due to the existence of a 'hobo' class without regular occupations, to an increasing degree.

The co-operation of the officials of the courts is absolutely necessary in order to secure trustworthy materials upon which to base conclusions reasonably accurate.

BIRTHPLACES OF CRIMINALS.

The English and Irish born portion of our Canadian population show a tendency to a decreasing ; the Scotch to an increasing proportion of the criminals. Criminals born in Canada show a tendency to decrease relatively to the mass of criminals recorded. The Canadian born formed 87 per cent of the total population in the Census of 1901. The criminal born in Canada formed 66 per cent of the criminal population in 1903, showing that the outside element, which is 13 per cent of the whole population, contributed 34 per cent of the criminals, considerably more than its proper share.

The foreign-born elements in Manitoba, the North-west and British Columbia do not appear to have contributed more than their share towards the criminality of those portions of the Dominion. Considering the large influx from outside into the west, it is highly gratifying to have from the statistics of the criminal courts so satisfactory a certificate of the high standing of the immigrants going into the west.

The statistics indicate that the tendency towards a habitually criminal class, marked in other countries, is also in evidence in Canada. Taking the average of sixteen years—1887-1902—as a fair indication of the tendency, there has been an increase from 7·50 per cent to 9·03 per cent in 1903.

With regard to juvenile delinquency, the records indicate a large increase in the list of boy criminals. In the period 1887-1890, boys under sixteen years convicted of indictable offences were 14·33 per cent of all the convicted of all ages. In 1889-1903, they were 15·43 per cent.

SUMMARY CONVICTIONS.

Of summary convictions there were 43,862 in 1903, an increase of 6,046, or 15·8 per cent; equal to nearly one-sixth. Nova Scotia shows an abnormal increase of 29 per cent. The North-west Territories show a still larger increase of 148 per cent. A great part of the increase in Nova Scotia is due to an abnormally large increase in the judicial district of Cape Breton, where the increase was 1,273, while the total increase for the province was 1,003 convictions.

DRUNKENNESS.

The convictions for drunkenness in 1903 were 16,532, an increase of 3,805 compared with 1902. Of these, 693 were convictions for drunkenness in the town of Sydney, N.S.

All the provinces, excepting Quebec and the Yukon, show increases. The statistics of the courts in respect to drunkenness agree with the returns published in the Statistical Year Book, which show that consumption of spirits has increased between 1900 and 1903 by 24 per cent.

THE STATISTICAL YEAR BOOK.

This work is published by my department under authority of chapter 59, section 6, Revised Statutes of Canada.

The demand for the book is greater each year. To meet this increasing demand, parliament granted an increased appropriation for the Year Book, and, acting upon it, I had 1,400 added to the number printed for 1903—1,000 English and 400 French. In the previous year, the added numbers were 1,500 English and 200 French. The demand still remains greater than the supply. Advantageous openings present themselves all the time in a yearly increasing degree as Canada attracts increased attention among the nations of the world.

The plan of issue is to send first to the members of parliament and the government, the members of the several legislatures and the executives of the several provinces, then to the leading newspapers, boards of trade, banks, libraries, British consuls and other representatives of different countries, the legislative libraries of other parts of the British Empire. The remainder is held for distribution in Canada, according to a permanent list, and to meet applications. It is in connection with the permanent list and applications that the supply falls short.

The following are the dates of the issues of the Year Book:—

1896—Issued		October 12, 1897
1897—	"	October 4, 1898
1898—	"	October 10, 1899
1899—	"	August 21, 1900
1900—	"	June 22, 1901
1901—	"	May 15, 1902
1902—	"	May 28, 1903
1903—	"	June 29, 1904

The provincial governments, I am pleased to note, have co-operated most heartily in the effort to publish the Year Book at an early date. The municipal authorities have been prompt in supplying the material required, and the various commercial and manufacturing firms from whom information was sought, kindly and most considerately gave their prompt attention to the circulars sent them.

There is a great demand for back numbers to make up full sets. The demand from the United Kingdom for full sets has increased very considerably. As a result, the issues of 1893, 1894, 1895, 1896, 1898, 1899, 1900 and 1901 are exhausted.

The Year Book in French is increasingly demanded. Of late years (1891-8), there remain very few copies, and of 1891, 1893, 1894, 1895, 1896, 1897, 1900, 1901 and 1902, none at all.

There has been a very considerable demand for other publications of the statistical division. The Criminal Statistics have been sought after by writers of other lands, as well as by students in Canada. The handbook on Canada and the pamphlet on pulp-wood were in demand in the St. Louis Exhibition.

The correspondence of the statistical branch increases steadily from year to year, due in part to the large edition of the Year Book issued, and to the increasing demand for it, and also to the ever-increasing demand for general statistical information by the public.

The whole respectfully submitted.

SYDNEY A. FISHER.
Minister of Agriculture.

PUBLIC HEALTH.

No. 1.

REPORT OF THE DIRECTOR-GENERAL OF PUBLIC HEALTH.

F. MONTIZAMBERT, M.D.Ed., I.S.O., F.R.C.S., D.C.L.

October 31, 1904.

SIR,—I have the honour to submit this my annual report as Director-General of Public Health to October 31, 1904.

This year, like the ones immediately preceding it, has been marked by the continued threatening of bubonic plague, cholera and small-pox.

Strict measures, ordinary and special, have therefore been required for the sanitary protection of the country. The special measures explained at length in previous annual reports have therefore been continued throughout most of the year.

Frontier inspection for small-pox at threatened ports of the international border, and extra inspections at some of the maritime ports have been maintained more or less throughout the year as the conditions to the south of us have seemed to require. The epidemic of this disease which has raged in the United States for the last four years seems now to be drawing to an end. The number of cases reported has become so small that it has been considered safe to suspend the services of the frontier inspectors this summer. Whether the diminution of the disease and its present practical return to its ordinary limits be permanent, or whether it be largely due to the usual seasonal lessening in summer to be followed by renewed increase with the setting in of winter remains of course as yet to be seen.

On the Pacific side careful inspection of all arriving Asiatics has been carried on throughout the year. This includes the testing of the temperature and the examination of the glandular regions. Inspection of passenger vessels from San Francisco is continued on account of the possibly continued presence of plague in that city. The last death reported was on March 1, 1904.

Precautions as to funnels on hawsers, guarding of gang planks, &c., to prevent the embarkation of rats at ports of departure or their landing at our ports have continued to be impressed upon the shipping companies.

Dominion Department of Public Health.—The Canadian Medical Association at its meeting in Montreal, in 1902, passed a strong resolution to the effect that it is expedient that a Department of Public Health be created by the Dominion government, and administered under the authority of one of the existing Ministers of the Crown, thus bringing all general questions relating to sanitary science and public health under one central authority to be known as the Public Health Department. In 1903, at the London meeting, this resolution was reiterated, and the committee that had been charged with the matter was urged to press it strongly upon the immediate attention of the government. This year, in August, at the meeting in Vancouver, B.C., the committee submitted the following report :—

'Your committee in charge of the question of the establishment of a Department of Public Health by the Dominion government have the honour to report that the matter has, to a certain extent, been in abeyance since our meeting at London last

year. At that meeting you will recollect we reported certain interviews with the Prime Minister and the Minister of Agriculture, at which we were led to understand that it was not feasible for the government to give us any assurance that our wishes in the matter could be practically considered. The resolution again passed at London pressing the subject on the attention of the government as one closely associated with the country's welfare and best interests was duly forwarded to the Dominion authorities.

'It was also pointed out to the Hon. the Minister of Agriculture by the convener of your committee that the medical profession of the Dominion as represented by the Canadian Medical Association were united in their desire to have such a department created and that they were only actuated in the matter by motives of patriotism, feeling assured that the administration of public health in matters pertaining to the Dominion government would be greatly facilitated and rendered more useful and satisfactory if it emanated from a central department instead of having a series of branches having executive authority scattered through a number of departments of the government.

'Your committee are gratified to be able to report that there are evidences that, during the present recess, the matter will engage the attention of the Privy Council more seriously than it has hitherto done. Before legislation could be introduced, certain questions involving much consideration will have to be settled, and we are given to understand that these preliminaries will be weighed before Parliament meets. While it is to a certain extent unsatisfactory to be obliged to report in such an indefinite way, yet we trust the association will understand we have not been idle, but that in a matter of this kind we are in the hands of the goodwill of the government and that it would be neither judicious nor delicate to compromise the present favourable opportunity by referring in detail to the reasons that have enabled us to hazard our present opinions.'

And the following resolution was moved by Dr. Lafleur, of Montreal, seconded by Dr. Meredith Jones, of Victoria, and unanimously carried :—

'That the Canadian Medical Association regret that the Dominion government have not yet seen their way clear to carrying out the suggestions contained in the several strong resolutions of this association passed during the past three years on the question of the establishment of a Department of Public Health under one of the existing Ministers of the Crown.

'That it be further resolved that this association continue to press the wishes of the medical profession of the Dominion on this subject on the attention of the government inasmuch as we feel assured that the difficulties to be overcome in order to bring about such a desirable end are of small consequence to the public welfare compared to the beneficial results that will follow.

"That the sub-committee in charge of this matter be reappointed at this meeting and requested to continue their efforts of the past three years.

'That a copy of this resolution be sent by the General Secretary to the Right Hon. the Prime Minister, to the Hon. the Minister of Agriculture and to the Hon. the Secretary of State.'

In England, the British Medical Association is busily engaged in advocating the extension of the powers vested in the health departments of the civil, naval and military populations on a scientific basis. The Bradford meeting of the Sanitary Institute, the Brussels Congress of Hygiene, 1903, and many other meetings have approved the formation of a health ministry, with or without an expert as Cabinet Minister of Public Health.

In New South Wales, a conference of officers of various boards of health drafted a bill for the establishment of a central department, under the control of a director-general, who should be a man possessing both scientific and administrative attainments, and should be paid at a salary of at least £1,800 per annum, with a well paid assistant and a sufficient staff to enable him to carry out his various and onerous duties. And they further recommend—as I have done here for years—that the central office should have attached to it a complete laboratory.

Public Health Science.—A paper was read on this subject last month by Prof. Wm. T. Sedgwick, of Boston, he said : 'that he used the term public health science advisedly, for any division of human knowledge that had worked out its own laws with strict adherence to the rules of inductive and deductive reasons as public health science had done, and which had reached results which enabled it to predict with accuracy as could now be done in public health science, was entitled to an honourable place among the physical sciences. Public health science had its rise and remarkable development in the eighteenth century; before that time, efforts tending to promote or protect public health being entirely empirical and as often directed to the convenience of mankind as to their safety. In 1767, Sir George Baker made the first scientific discovery in public health science, which happened to be in epidemiology, when he found that the epidemic of colic in Devonshire, England, was due to an obscure poisoning by lead conveyed through the common cider of that district. In 1774, the foundations of state hygiene and sanitation were laid, in consequence of the startling revelations of John Howard, by an Act of Parliament providing for the sanitation of jails and prisons. The beginnings of marine hygiene and sanitation appeared in 1776 when Captain Cook was awarded the Copeley medal of the Royal Society for his remarkable success in protecting the lives of his sailors on his second voyage. In 1796, Edward Jenner, who also worked in a strictly scientific manner and employed the methods of rigid inductive research, laid securely for all time the foundations of personal hygiene and immunization by showing that such modifications of the physiological resistance or susceptibility of the human body could be produced at will so as to make it immune to small-pox. In the eighteenth-century discoveries were the germs of some of the most important divisions of public health science, namely, epidemiology, sanitation, and immunization, and their importance to the public health science of the time and to the development of public health science for all centuries to come was incalculable. In 1802, the beginning of factory hygiene and sanitation was made; in 1829, the first municipal water filter was constructed; in 1834, the discovery of the important relation of poverty to public health, revealed in the famous report of the Poor Law Commissioners; in 1839, the beginnings of registration and accurate statistics; in 1854, for the first time, was clearly taught the lesson, even yet not properly taken to heart, that water may be the ready vehicle of a terrible epidemic of cholera. From 1860 striking epidemics of trichinosis came into public notice, and here, also, belonged the magnificent work of Pasteur; in 1868, Lister following in the footsteps of Pasteur, revealed the true basis of cleanliness in asepsis; in 1876, bacteriology became firmly established by Koch's studies on anthrax. The decade from 1880 to 1890 could be called the decade of etiology, since then were discovered the hitherto unknown microbes of typhoid fever, tuberculosis, malaria, Asiatic cholera, diphtheria, and tetanus. There was an extraordinary public awakening in England in the middle of the nineteenth century to the importance of sanitation and public health measures, but for some time there was no marked inoculation between public health science and other sciences, such as physics, chemistry, microscopy, bacteriology, climatology, engineering or education. It was not until Pettenkofer and his disciples in Germany, and Angus Smith and others in England, began their splendid chemical work that the tributary stream of sanitary chemistry added materially to that of public health science. The science of architecture, including building construction, heating and ventilation, has done and will continue doing much of importance to the student of public health science.

Bubonic Plague.—This disease has occurred during the year in South Africa, Australia, Brazil, Chile, China, Egypt, Formosa, Hawaii, India, Japan, Mauritius, Peru, Philippine Islands, Turkey, and in San Francisco.

India.—This disease has continued its ravages in epidemic form throughout the year, the deaths at the height of its seasonal intensity showing the appalling mortality of 40,527 in a week. It is calculated that since 1896 over 2,000,000 people have died

in India from the plague. In answer to a question in the British House of Commons Mr. Brodrick replied that all possible care was taken to prevent the spread of plague throughout India. Speaking generally the State medical officers of the native States forming the Central India agency applied in the territories of their respective states the preventive and remedial measures which were employed in British India. These comprised (1) the provision of hospitals and medical aid for the sufferers; (2) disinfection of infected houses; (3) evacuation of infected quarters in towns and villages; (4) refuge camps for the uninfected; (5) inspection posts and observation huts at railway stations and on main routes; (6) inoculation where desired.

South Africa.—Plague has existed in Cape Colony for some four years, and although in no town or district except, perhaps, Port Elizabeth, has plague assumed any considerable proportions, yet the continued presence of the disease in both men and rats in several towns of Cape Colony and in Durban, Natal, rendered the possibility, of a serious outbreak, either within the infected area or in adjacent towns or districts, an ever-present cause of anxiety. Plague has visited the following towns in South Africa since it first appeared : Cape Town, Port Elizabeth, East London, Queenstown, King William's Town, Knysna, Lady Grey Bridge and Durban. It is still present at Port Elizabeth, there being three cases under treatment there, the last discovered on the 19th instant.

Plague-infected rodents continue up to the last reports, October 24, to be found there, and at East London.

In the Transvaal, there has been quite an outbreak, at Johannesburg : also to a lesser degree in Pretoria. It is claimed, however, under date of October 15, that the Transvaal is now clear of plague.

In Hong Kong, the disease was not as prevalent as last year, and it has again subsided with the passing of the warmest season.

In Russia, there was a case of laboratory infection of plague near Cronstadt :—

'The laboratory for plague reseach at St. Petersburg is located on an isolated island near Fort Alexander. The director of the institute for experimental medicine and the production of antiplague serum was engaged at the laboratory with living plague cultures when he contracted the plague, January 26, and died in four days, notwithstanding repeated injections of antiplague serum. All the other persons connected with the laboratory were given preventive injections, but two new cases have developed. The entire establishment is strictly quarantined. The death of the director recalls those of Dr. Müller at Vienna and Dr. Sachs at Berlin, under similar circumstances.'

In San Francisco, there has not been a death from plague since March 1, 1904. The summary is: calendar year 1900, 22 cases, 22 deaths; 1901, 30 cases, 25 deaths; 1902, 41 cases, 41 deaths; 1903, 17 cases, 17 deaths; 1904 to date, 9 cases, 8 deaths; total, 119 cases, 111 deaths.

The sanitary work and inspection still goes on in Chinatown, San Francisco, the following being the last summary of work reported from there in Public Health reports for the week ending the 29th instant :—

Buildings reinspected	235
Rooms	1,793
Persons inspected	2,390
Sick	15
Sick prescribed for at oriental dispensary	15
Dead examined	5
Necropsies	1
Rats examined bacteriologically	55
Number showing pest infection	0
Places limed and disinfected	850
Times streets swept	3
Sewers flushed	18
Blocks covered with Danysz virus	18

Sewers baited with phosphorus poison	18
Notices sent to abate plumbing nuisance	8
Abated	7
Undergoing abatement	12
Total number of plumbing inspections	109

In Sydney, New South Wales, plague-infected rats continue to be found in certain parts of the city, principally in the neighbourhood of Sussex street, where the produce stores are chiefly situated. Two rather rapidly fatal cases of plague in human beings have occurred at a large house situated some miles from the centre of the city, in a healthy suburb. The first case was that of a coachman who was employed at this house; he slept over the stables, which were found to be overrun with rats. Bacteriological examination of two dead rats from this house proved them to be plague-infected, and it is surmised that they were infected by other diseased rats carried to this house in fodder. The second case was that of a woman, aged 31, a housekeeper employed at the same house, who had gone to visit the sick coachman, and who herself became infected, and died in about forty hours. The occurrence of these two fresh cases has again called forth a warning from Dr. Ashburton Thompson, the President of the Board of Health, who reminds citizens that the recurrence of an unusual mortality amongst rats, and the finding of dead rodents in unusual places, would be considered as evidence of the existence of plague. Under these circumstances, if people so situated do not give the Health Department immediate information on the matter, they will be liable to prosecution.

Serumtherapy of Plague.—A correspondent of the *British Medical Journal,* September 24, 1904, gives the following description of the Bombay Plague Research Laboratory :—

"'This laboratory was founded by Mr. Haffkine at the outbreak of plague in India at the end of 1896. Very soon it became clear that general measures of disinfection, isolation, segregation, etc., were not applicable to the circumstances of this epidemic. The activity of the laboratory was then concentrated on the manufacture and distribution of the prophylactic for preventive inoculation worked out and introduced by Haffkine. During the seven and a half years that the laboratory has been working under his direction, the number of doses of the material issued to applicants in India and other countries has amounted, up to the end of March last, to 5,757,225. Of these, 504,966 were supplied to countries outside India, and 5,252,259 to districts in India.

'It is claimed that the number of deaths from plague has been reduced by this inoculation to less than one-sixth of what it is among the non-inoculated. In the severe epidemic in the Punjab of 1902-3, half a million people were inoculated by medical men specially sent out from England. According to the latest information published by the government of India, the proportion of deaths to attacks in the inoculated was under 25 per cent, or less than one-half of that observed in the non-inoculated. From numerous observations it results that the number of attacks is less than one-third of that in the non-inoculated population. These figures refer to the Indian natives, whose susceptibility to plague is, like that of the Chinese, much higher than the susceptibility of the white races. Among inoculated European residents no fatal cases of plague have so far come to notice.

'The prophylactic material for inoculation according to Haffkine's method is now manufactured and obtainable not only from the Bombay Laboratory, but also from the Local Government Board, through Professor E. Klein, at St. Bartholomews' Hospital; from the Lister Institute for Experimental Medicine; from the Thompson-Yates Laboratories, Liverpool; from the Pasteur Institute in Paris; from the Institut für Infektionskrankheiten, in Berlin; from the Institut Impérial de Médecine Expérimentale, St. Petersburg; from the Swiss Bacterio-Therapeutic and Vaccinal Institute, Berne; from the Government Laboratory in Pianosa, Italy, and from the Laboratory of the Insular Board of Health, Manila, Philippine Islands.

'Attempts at treating native patients in hospitals with antiplague curative serums have not been successful. The first experiment in this direction was made in 1897-8, soon after Dr. Yersin's original publication, with a serum prepared in Bombay by M. Haffkine. An inquiry which he instituted led him to the conclusion that the treatment had no effect on the mortality rate. The preparation of that serum in Haffkine's Laboratory was then abandoned; but in 1898-9, an experiment on a large scale was carried out in one of the Bombay plague hospitals with a serum prepared by Professor Lustig, of Florence, the method of testing being the same as was applied by Haffkine to his serum. This method, in its main features, consisted in treating one out of every two patients admitted to hospital, and comparing the clinical features of the disease and the mortality rate with those in the remainder of the patients. Of 900 cases thus admitted, the 450 so treated had 55 deaths less than the 450 not treated; but a careful analysis of the cases showed that, in this experiment, there was a marked preponderance of grave cases among those admitted into the non-treated group, compared to those in which the serum treatment was applied. Between November, 1902, and July, 1903, another experiment was made, under stricter conditions, and under the direct supervision of the laboratory, with a serum prepared by Professors Terni and Bondi, in Messina. In this instance, the cases for treatment were taken alternately, as they came in, no selection of any kind being permitted. Of 111 patients thus treated 90 died; of 112 admitted alternately with the above, and left without serum injections, 91 died. Subsequently, another batch of 16 patients were treated with the same serum in another Bombay hospital, 16 alternate patients being left for comparison. Of the first category 12 died, and of the second, 11. In 1904, a serum prepared by Dr. Brazil in San Pavlo, which was reported to give good results in Brazil, was tried by the laboratory. In one hospital the proportion of deaths, among the injected, was 41 out of 50, and among the control cases, 45 out of 50; in another, the injected gave a proportion of 17 deaths out of 20, and the control cases, of 15 out of 20. The treatment in all cases consisted in hypodermic injections, the doses in the latter experiments amounting sometimes to several hundred cubic centimetres. Investigations have now been started with Yersin's serum manufactured in the Pasteur Institute in Paris, and intravenous injections are being tried. M. Haffkine is of opinion that his results, so different from those reported by other experimenters, may be due to the greater susceptibility to plague of the natives in India, as well as to the difficulty of getting them early for treatment in hospitals.

'Investigations made in the laboratory into the transmissibility of plague by means of rat fleas have given so far negative results, though the hypothesis itself appears extremely plausible. A large amount of research has been done in the laboratory in various other directions in connexion with plague and other disease, such as different methods of disinfection, serum diagnosis of enteric fever, Malta fever, plague; distribution of plague bacilli in tissues and secretions of sick and convalescent; the presence or otherwise of plague microbes in dwellings, clothing, furniture, and soil, and in various species of animals, &c., as well as on cholera, relapsing fever, scurvy, epizootic lymphangitis, beri-beri, snake venom and antivenene, scorpion venom, diphtheria, leprosy, variola and vaccinia, surra, lathyriasis; on the morphology and classification of mosquitos, &c. Only a part of these investigations has been published, the majority being contained in laboratory records and reports to government, which will never see the light of publicity. We understand that certain difficulties exist in the matter of publication, and this has had a deterring and paralysing effect on the laboratory's activity. M. Haffkine's work in India has a world-wide interest, and it is essential that any regulations which hinder the publication of his results should be removed as soon as possible.'

Duprat (*Ann. de l'Institut Pasteur*) reports the results of the treatment of forty-five cases of plague with the Roux-Yersin serum. At the commencement of the epidemic, the doses employed were from 60 c.cm. to 80 c.cm., repeated or not, every twenty-four hours, according to circumstances. Sixteen cases were treated in

this manner, with a mortality of 31·25 per cent. Subsequently this dosage was largely increased up to an initial dose of 300 c.cm. in one case. The results thus obtained were much better than those obtained with the smaller dosage, and the mortality fell to 13 per cent. A number of cases are related, of which the following may be taken as an example: A child aged 10 years, when first seen, had a temperature of 39·80 C., pulse, 130 and compressible, rapid respiration and marked collapse. He could with difficulty be got to answer questions, and had a very painful bubo in the left inguinal region. He received a first injections of 100 c.cm., followed twelve hours later by 120 c.cm., then at the same interval 80 c.cm., and, twenty-four hours after, 60 c.cm. Recovery took place, complicated by general articular pain—a frequent effect of the serum injection. The injections were all subcutaneous, and Duprat comments on the difficulties of Calmette's method of intravenous injection.

The importation of a monthly supply of some fresh Yersin serum from the Lister Institute of Preventive Medicine, London, England, has been continued throughout the year, so that it might be supplied promptly from here to any of your stations where plague should show itself.

The steamship *Bishopsgate* arrived at Newcastle on the River Tyne on the 20th ultimo with bubonic plague on board. The ship had brought a cargo of wheat, maize, and bran from Rosario in the Argentine to Hamburg. On arrival in Hamburg, on August 29, no one on board had plague, but the rats were found infected. The crew were discharged, a fresh crew engaged, the ship fumigated and cleaned. On arrival on the Tyne on September 20, one man was found suffering from plague, from which he is recovering. No other cases occurred on board ship.

Modern Methods of Disinfecting a Plague Ship.—Nocht, of Hamburg, gives the details of the disinfection of the steamer *Cordova*, which arrived from Brazil, December 25, 1903. Every ship arriving at Hamburg is searched for dead rats by the sanitary authorities. During the last year they were found in thirty-six ships and plague bacilli were found twice. When the *Cordova* began to unload, the inspectors found at noon seven dead rats. By three o'clock the ship was notified that the findings were suspicious, and it was ordered to leave the quay and anchor in the open water. The Nocht-Giemsa disinfecting apparatus was installed the same day, and the hold and living rooms were filled with the gas generated. The next morning fresh air was pumped into the hold by the same apparatus, and the unloading of the ship on lighters allowed to proceed. The cargo consisted of sacks of coffee and bran, and as each sack was brought up it was inspected by the sanitary officer. All on which there were signs of rat manure or gnawing were loaded into a separate lighter, which was isolated for a period of two weeks, with no possibility of contamination from other rats, after which the unloading was allowed to proceed without further restrictions. None of the rest of the cargo was interfered with, and it was unloaded and stored in the warehouses as usual. No plague rats were found anywhere in the ship except in the compartment where the first had been discovered, and all in this compartment had died before the gas disinfection. The gas killed 139 rats in all, including a number of nests of young rats in inaccessible crevices. The crew and others working on the ship were required to wear an outer suit while at work, with gloves, &c., and on leaving work to clean their hands and shoes with kresol soap. They were examined by a physician once a day, and for five days after the unloading of the ship was completed. Otherwise they were not interfered with. After the ship had been unloaded it was disinfected anew with lime in the hold and the living rooms with formaldehyde. All the sweepings of the ship were burned, as is compulsory for all ships in Hamburg harbour. In five days from the finding of the dead rats, the sanitary officers withdrew and the ship sailed in two days with a new cargo. A few sacks had been carried into the warehouse before the first rats were found, and they were isolated by covering them with tarpaulins and building a high board partition around them, shutting up in it a couple of trained rat dogs. After the two weeks' period was past the partition

was removed and the sacks not further interfered with. The purpose of these measures was to keep the rats in the warehouse from access to the sacks during the period of isolation. No case of sickness developed among the crew or those having anything to do with the ship.

Destruction of Rats in France.—The ravages caused by the field rats in agricultural districts of France have caused the government to take up the matter. A Bill has been submitted by the government to the Chamber of deputies providing for the issue of bonds to raise $70,000 to be applied to the destruction of field rats. Experiments have recently been made on a large scale in la Charente where a large tract of land—about 3,000 acres—was honeycombed with rat holes. The work was in charge of Danysz and Chamberland of the Pasteur Institute. Cultures of the bacillus which Danysz has found is pathogenic for field rats were spread on bread or oats and distributed in and near the rat holes. Over 10,000 pounds of bread and twice this amount of oats and 1,200 bottles of the virus were used. The results showed that 95 per cent of the rats had been destroyed. The campaign progressed without mishap and no domestic animals were injured.. It is unfortunate that no virus has yet been discovered effectual against the town rat, which is much more resistant. Roux believes that the prospects are bright for this achievement in the near future. The legislation now in progress contemplates that the land owners must pay a certain proportion of the expense of the anti-rat campaign. Rats are not only concerned in the transmission of the plague, but also a trichinosis. Certain epizootics are likewise due to them, as they transmit the germ, although they do not contract the disease.

Cholera.—This disease has appeared during the year in Afghanistan, Borneo, China, Formosa, France, India, Japan, Persia, Philippine Islands, Russia, Straits Settlements and Turkey.

The following note on Mohammedan pilgrimages is from *U. S. Public Health Reports* of the 28th instant :—

'The notification of the sanitary board of Constantinople states that by special regulation applicable to the Mohammedan pilgrimage from the Hedjaz for the season of 1904-5, the lazaret of Camaran has been ready to receive maritime arrivals since September 11, 1904, and will continue in operation until March 7, 1905, this period corresponding to six months of the Mohammedan year. During these six months vessels having pilgrims aboard coming from beyond the strait of Bab-el-Mandeb, no matter what sort of bill of health they carry, must, with the exception of certain craft hereinafter mentioned, proceed direct to the lazaret of Camaran without stopping at any port of the Red Sea. All Mussulmans arriving at the Hedjaz are considered to be pilgrims. Pilgrim vessels are defined as those arriving at the Hedjaz with pilgrims aboard, with the exception, however, that vessels are permitted to carry one pilgrim for each 100 tons net register without falling into the category of pilgrim vessels. The latter class of vessels are treated in accordance with the character of their bills of health and in conformity with the regulations of 1867, applicable to arrivals from cholera-infected places.

'Vessels on which the number of pilgrims embarked is strictly limited to a figure not exceeding five for each 100 tons net register must, at all periods of the year, go to the lazaret of Abou-Saad, near Djeddah, which is in operation the whole year. They will land there all passengers and merchandise bound for the Hedjaz, after which they will be free to continue their voyage. Sambouks and other coasting craft carrying pilgrims are treated as pilgrim vessels. Those which go from one port to another are subject to quarantine at the lazaret of Abou-Saad. On the other hand, those which come from outside the strait of Bab-el-Mandeb must go direct to the anchorage of Camaran.'

Yellow Fever.—In 1901, a commission composed of Messrs. Marchoux, Salimbeni and Simond, of the Pasteur Institute, was appointed to conduct investigations regard-

ing the etiology of yellow fever and the mosquito *Stegomyia fasciata* in the transmission of the disease at Rio Janeiro. This commission rendered a report, which was thus summarized by the *Jour. A. M. Association* in May last :—

'The commission concludes that the infecting principle in the blood of yellow fever patients remains active for five days when kept in defibrinated blood under liquid vaseline, but that at the end of eight days the infectivity of the blood has disappeared. They deduce as a result of their experiments that the blood contains this infecting agent during only the first three days of the disease.

'They deduce further from their experiments that the blood serum of a yellow fever convalescent possesses clearly preventive properties. They further deduce as the result of experiments on eleven individuals made in hospital that the blood serum of a yellow-fever convalescent possesses therapeutic properties of considerable curative value.

'In regard to the mosquito *Stegomyia fasciata*, their work is particularly valuable. They point out that the habits of the *Stegomyia fasciata* differ very much from those of most other mosquitoes. One of the marked peculiarities of the species is its extreme susceptibility to differences of temperature. It manifests its greatest activity when the thermometer stands at 25 C. Beyond 39 C. the insect dies. At 15 C. to 16 C. the insect becomes inert and ceases to bite. At 12 C. to 14 C., it is benumbed and flies with great difficulty. All of the acts of its life are much influenced by the temperature of the surrounding atmosphere.

'The female stegomyia alone bites. The female is perfectly capable of biting immediately after metamorphosis. Within twenty-four hours she bites readily. Within forty-eight hours of metamorphosis and at temperatures between 26 C. and 35 C. she will bite readily at any hour of the day if recently fecundated, but especially beginning at about 11 o'clock in the morning. If the temperature is between 19 C. and 25 C., she bites less readily. At temperatures between 14 C. and 18 C., she does not seek to bite at all unless artificially warmed by contact with the skin of the victim. She bites less readily between 22 C. and 25 C., but a temperature of 27 C. to 30 C. is that which suits the insect best.'

The general conclusions of the commission may be summed up as follows :—

1. The serum of a patient on the third day of the disease is virulent.

2. On the fourth day of the disease, yellow fever blood no longer contains any virus, even when the fever is high.

3. One-tenth of a cubic centimeter of virulent serum injected under the skin is sufficient to cause yellow fever.

4. The virus of yellow fever rubbed on a blister of the skin, made by removing the epidermis, does not give the disease.

5. In the serum of the patient, the virus of yellow fever passes through a filter Chamberland F without dilution.

6. Under the same conditions it does not appear to pass through filter B.

7. Virulent serum preserved exposed to the air at a temperature of 24 C. to 30 C., is inactive at the end of forty-eight hours.

8. In defibrinated blood, preserved under liquid vaseline at a temperature of 24 C. to 30 C., the microbe of yellow fever remains living for five days.

9. At the end of eight days defibrinated blood, kept under the same conditions, no longer contains active virus.

10. The virulent serum becomes harmless after heating for five minutes at 55 C.

11. A preventive injection of serum heated for five minutes at 55 C., confers a relative immunity which, followed by inoculation with a very small quantity of virus, may become complete.

12. The injection of defibrinated blood, kept in the laboratory under liquid vaseline for eight days at least, confers a relative immunity.

13. The serum of a convalescent is endowed with clearly preventive properties.

14. The immunity conferred by the serum of the convalescent is still in evidence at the end of twenty-six days.

15. The serum of a convalescent appears to have the therapeutic properties.

16. As has been proved by Reed, Carroll and Agramonte, yellow fever is produced by the bite of the *Stegomyia fasciata*.

17. To be able to produce the disease in man, this mosquito must be previously infected by absorbing the blood of a patient stricken with yellow fever during the first three days of the disease.

18. The infected mosquito is only dangerous after an interval of twelve days from the time when it has ingested virulent blood.

19. The bite of two infected mosquitos may cause a serious illness.

20. The mosquito appears to be more dangerous in proportion that her bite is delayed after the time when it has become infected.

21. The bite of infected mosquitoes does not invariably give yellow fever.

22. When the bite of infected mosquitoes has been without effect, there is no immunity conferred against the injection of virulent serum.

23. In the neighbourhood of Rio de Janeiro, as in Cuba, no other mosquito than the *Stegomyia fasciata* is concerned in the transmission of yellow fever.

24. Contact with a patient, his personal effects, or his excretions, is incapable of producing yellow fever.

25. Outside of the bite of the infected stegomyia, the only means known of producing the disease is the injection into the tissues of a susceptible individual of blood from a patient collected in the first three days of the disease.

26. Yellow fever can only assume a contagious character in regions where the *Stegomyiæ fasciatæ* prevail.

27. The prophylaxis of yellow fever rests entirely on measures taken to prevent *Stegomyiæ fasciatæ* from biting the individual sick and then a healthy individual.

28. It must be borne in mind that the period of incubation of yellow fever may be prolonged up to thirteen days.

29. The Stegomyia fasciata is frequently infected by moulds, yeasts and by sporozoa. No parasite of this species recognized up to this time has any causal relation to yellow fever.

30. Neither in the mosquito nor in the blood have we succeeded up to this time in discovering the casual agent of yellow fever.

Observers disagree as to its hours of feeding, but the disagreement is more apparent than real. All agree that its principal time of flight is in the afternoon : It is 'essentially crepusoular.' Reed says: 'after four o'clock.' The New Orleans Commissioner : 'especially in the afternoon hours.' The Vera Cruz Working Party states 'early in the morning and late in the afternoon.' It does not feed in the dark nor does it in a strong light, and its feeding seems more dependent on the degree of light than on the time of day. If the place be fairly light it approaches its victim on the shadow side, thus especially attacking the ankles under a writing table, or the hand under the head during siesta. It bites after dark if there be artificial light in the room. It does not bite out of doors in ordinary bright daylight.

The above habits, together with the fact of its being a house mosquito and the infected insects being mainly confined to dwelling houses, explain the comparative safety of 'day-light communication,' *i.e.* entering a town only after 10 a.m., and leaving by 4 p.m. under pledge to go in only on sunny days and to enter no residence : sometimes not to go into the residence portion of the city. The danger of staying all night was really the danger of the late afternoon, early evening, and morning hours spent, of course, in residences.

A recent writer thinks from his observation afloat on salt water in the lee of islands and mosquito-infected shores that the Culex of the salt marshes is quite frequently carried considerably over a mile by light, steady breezes, long continued.

Is this true of the Stegomyia ? It is a far lighter insect, more fragile and apparently with very little wing power. It probably never flies high. It is found, by preference, in the lower stories of houses, and would thus be little liable to conveyance by wind, and its feeble power of flight should prevent its passing over any considerable distance by its own wing power. Nearly two years ago, the writer suggested that this problem be taken up, it being of importance in determining the anchorage of vessels in yellow-fever ports. So far he knows of no direct observations on this subject, except those of Goldberger at Tampico, and of Grubbs at Ship Island Quarantine. The latter found Stegomyiæ aboard three vessels from Vera Cruz, two of which claimed to have lain a half mile from shore. He believed they came aboard at Vera Cruz. The observation of Goldberger will be given later.

Although direct observations on this problem are few, yet there are certain indirect ones, bearing, however, entirely on the aerial conveyance of the Stegomyia infected with yellow fever. It is notorious that yellow fever is usually conveyed but a short way aerially, across the street,' or, more often 'to the house in the rear,' which is about as far as it was expected to be thus conveyed. This represents a maximum distance of about 75 yards. The two longest distances recorded in recent times of aërial conveyance, one of 25 meters (Mèlier) and one of 76 fathoms—456 feet (the writer) are entirely exceptional. So much for the distance which the (infected) Stegomyia is conveyed—or rather usually conveyed—aerially.

On the other hand it is known that vessels moored in certain districts of the Havana harbour did not develop yellow fever aboard, except in those who had been ashore, or unless they lay close to other vessels which were infected. This experiment has been made on so large a scale—with so many vessels and for so many years—that we must accept as a fact that an infected Stegomyia was not conveyed aerially from the Havana shore to those vessels, or, allowing for errors, was very rarely so conveyed. The distance which had been found safe was something over 200 fathoms—1,200 feet. The prevailing wind was generally slightly on shore, but was not constantly blowing. Whether there is any difference in the distance to which infected or non-infected mosquitos are conveyed, is, of course, entirely a matter of surmise. There is no apparent reason why there should be. Yet the infected Stegomyiæ have almost certainly become so in a house ; and with their very domestic habits must be found out of doors, where they would be subject to conveyance by the wind, in much smaller numbers than the uninfected insects, and consequently a lesser *number* of them would be conveyed aerially. Observation is needed on this subject—the distance (across water) that Stegomyiæ are aerially conveyed.

Goldberger, very ingeniously, suggests that on acount of its diurnal flight, the direction of the wind during the day only need be considered in estimating this factor in its aerial conveyance, and states that at Tampico he has failed to find Stegomyiæ aboard vessels lying, for ten or fifteen days, about half a mile from a shore where they were abundant, while numbers of Anopheles albipes and Culex pungens were found. The wind was on shore during the day and calm or off shore during the night. The importance of this point is obvious.

This disease has been present during the year in Brazil, Columbia, Costa Rica, Cuba, Ecuador, Mexico, Panama, Peru, Venezuela and Curaçao, in the West Indies.

In Havana, no case of yellow fever has originated since September, 1901, since which time the city has been entirely exempt from the terrible disease, that had there kept stronghold for a hundred and fifty years. Cases are now admitted into Havana from Mexican ports, but are treated under screens with perfect impunity, in the ordinary city hospitals. The crusade against the insects also caused a very large decrease in malarial fevers.

The destruction of the most fatal epidemic disease of the western hemisphere, in its favourite home city is but the beginning of the benefit to mankind that may be expected to follow the work of Reed and his associates. There can be no manner of doubt should Mexico, Brazil, and the Central American Republics, where the disease

still exists, follow strictly the example set by Havana, that yellow fever will become extinct and the United States forever freed from the scourge, that has in the past slain thousands of its citizens and caused the loss of untold treasure.

More recent investigations into the cause and spread of yellow fever have only succeeded in verifying the work of Reed and his commission in every particular and in adding very little to our knowledge of the disease.

Later researches by Guiteras in Havana, by the Public Health and Marine Hospital Service in Vera Cruz, and lastly by a delegation from the Pasteur Institute of Paris in Rio de Janeiro, all confirm in the most convincing manner, both the accuracy and comprehensiveness of the conclusions of the United States commission.

Small-pox.—This disease has prevailed extensively throughout the year appearing in Africa, Argentina, Austria-Hungary, Belgium, Borneo, Brazil, Canada, Chile, China, Columbia, Cuba, Ecuador, Formosa, France, Germany, Great Britain, India, Italy, Japan, Java, Mexico, Netherlands, Panama, Peru, Philippine Islands, Russia, Spain, Straits Settlements, Turkey, and the United States.

The epidemic of this disease in the United States, which has prevailed for the last four years, is diminishing greatly in both extent and virulence. In United States Public Health Reports the number of cases during the first six months of this calendar year is given at 11,367, and from July 1 to the 28th instant as 3,462. Last year the figures for similar periods were 26,937, and 10,469.

During this month there has been an outbreak of this disease in Chicago, which it is thought may be attributed to infected warm clothing put carelessly away last spring and taken out again now that the cold weather has returned. Dr. A. R. Reynolds, Commissioner of Health of Chicago, in a bulletin dated the 29th instant, reports as follows :—

'Upward of 270,000 vaccinations have been performed in the city since the first of the month—forty-odd thousand by officers of the department and the remainder by private physicians.

'Twelve new cases of small-pox were discovered during the week, but no new centre of infection; they are all traceable to the previous cases. Of the twelve only two had ever had vaccination even attempted; these two, 31 and 55 years of age respectively, exhibit old, imperfect scars made in childhood.

'Of the 45 cases in the Isolation Hospital at the close of the week 17 are unvaccinated children under the school age, 6 years. The figures are the sufficient argument for the school vaccination requirement. Not one case of small-pox has ever occurred among the hundreds of thousands of scholars in attendance in accordance with this requirement. On the other hand, there have been a number of cases, some fatal, in scholars admitted on false certificates of vaccination, fraudulently given by venal doctors. Such men are a disgrace to the profession; they are guilty of constructive homicide in every fatal case, and deserve the punishment therefor.

'While there are a number of severe cases under treatment it is believed all will recover—even the baby born with the disease and vaccinated twenty minutes after birth.'

The threatening of this disease being imported from the United States has lessened so much from dying out of the disease as an epidemic in that country that the last of your international frontier small-pox inspectors were withdrawn at the end of July.

In the North-west Territories some cases occurred during the year. Dr. Patterson, your very efficient officer for the Territories, now reports that there have been no cases for the last ten weeks, and that the disease as an epidemic has for the time at any rate ceased to exist.

This disease has also been brought to some of your maritime quarantines.

In each case the disease was stamped out at the station, and no subsequent consequent case occurred inland.

Small-pox prevention in Germany.—The *Medical Record* thus writes on this subject :—

'Many of the opponents of vaccination contend that the chief reasons small-pox has so greatly decreased are the general adoption of more efficient sanitation and the strict isolation of those suffering from the disease. When Germany is pointed to as a conspicuous example of the benefits of vaccination, these unbelievers say, but this result is not so greatly due to vaccination as to isolation. The British Local Government Board recently resolved to investigate the matter, and to decide as to whether isolation has been the main factor in practically driving small-pox out of Germany, or whether to vaccination must be given the credit for this desirable state of affairs. Accordingly Dr. Bruce Low, one of the inspectors of the board, was despatched to Germany some few months ago with instructions to make a thorough investigation of the small-pox question. Dr. Low has performed the duty placed upon him, and has just published a report in which all the aspects of the situation are dealt with.

'At the very outset the reporter met with a serious but suggestive practical difficulty. In Berlin, where he went first, he could hear of no small-pox in Germany. The Central Health Office knew of none, but to help him in his inquiry it was arranged that he should visit representative towns in the four chief States of the German empire—Prussia, Bavaria, Saxony, and Würtemberg. The towns visited were ten—in Prussia, Berlin, Cologne, Frankfort-on-Main, Wiesbaden, and Mainz; in Bavaria, Munich, and Nuremberg; in Saxony, Dresden, and Leipzig; and in Würtemberg, Stuttgart. And so Dr. Bruce Low started on his quest through these towns, with a total population of nearly 5 millions. But it appears that from beginning to end he could not find a small-pox case in any of them. As a matter of history, indeed, the disease was known. In Berlin, there had been some 70 cases in seven years (1895-1901 inclusive) ; in Cologne, one case in 10 years ; in Frankfort, 9 fatal cases in 10 years; in Wiesbaden, 12 cases eleven years ago, but none since then; in Mainz, apparently none during eleven years; in Munich, 7 cases in eight years; in Nuremberg, none for about eleven years; in Dresden, no deaths for the past ten years; in Leipzig, 8 cases in eight years; and in Stuttgart, none in six years. The record is truly a wonderful one. There is nothing to be found like it anywhere else in Europe.

'As regards the small-pox which did occur in Germany, the amount of it due to foreigners is quite remarkable. Russia, Austria, and Italy are the principal contributors, and many of the outbreaks are near the Russian and Austrian frontiers. Dr. Bruce Low's notes on the ten towns he visited are very striking in illustration of the importance of foreign sources of infection. In Berlin, it has been already stated that about 70 cases ocurred in seven years. There were outbreaks in five of the seven years, and in every outbreak the origin of the infection was traced to foreigners—Russians, Italians, Austrians, Portuguese, and in one case to a group of performing negroes from Togoland. In Frankfort, the disease was twice introduced from Russia. Dresden is within thirty miles of the Austrian border, and thence receives its small-pox. Of 8 persons attacked at Leipzig in eight years, 2 were Russians and 4 Austrians.

'The law of Germany with regard to vaccination, is, as is well known, extremely strict and stringently enforced. This law requires infants to be vaccinated before the end of the calendar year following the year of the birth, and all school children to be vaccinated in their twelfth year. The notification of small-pox is obligatory throughout the Empire, and all persons suffering, or suspected to be suffering, from small-pox can be ordered to hospital for isolation if, in the opinion of the medical officer of the local authority, the patient cannot be properly isolated at home. On the occurrence of a case of small-pox in a house, the "contacts" are immediately vaccinated or revaccinated; and in some towns they are removed to a place of isolation until the time for the development of the disease has passed away. The provision for "isolation" is nowhere of such a kind as would satisfy English practice or requirements.

'The truth is that the whole German system of small-pox treatment and so-called "isolation" is dominated from beginning to end, and from centre to circumference,

by the great fact of the vaccination and revaccination of the people. The population, as a whole, is practically insusceptible to small-pox, and this consideration is supreme in every step taken in dealing with the disease.

'Dr. Low's general conclusion is that the German plan differs markedly from that employed in England and Wales by reason of the character of the so-called isolation. Untoward results to other persons from bringing small-pox to the sites of the general hospitals, have been seldom observed, and this, in Germany, is with one consent attributed to the protection afforded by statutory vaccination and revaccination, without which it is unanimously admitted that the method would break down. With this assistance Germany is able to dispense with separate small-pox hospitals and with any separate administration for the purpose of providing against the disease, and is thus freed, not only from a great expense, but from the suffering and inconvenience entailed upon England and Wales by the costly and half-hearted methods of dealing with epidemics as they arise, instead of preventing them from arising.

'The instance of Germany, with reference to the methods in vogue there for the prevention of small-pox, is a conclusive proof that vaccination and revaccination, carried out thoroughly and conscientiously, confers so great an immunity against small-pox that other means of dealing with the disease are rendered superfluous. It would be well if other nations were to take the lesson taught by Germany to heart and follow in her footsteps. There are times when the objector to vaccination, however conscientious, must be ignored and his principles must be sacrificed for the public good.'

Red light treatment of Small-pox.—Dr. Niels R. Finsen, who reintroduced this ancient treatment and has been the pioneer in modern scientific phototherapy died, September 24, in Copenhagen, aged 43. He was a native of the Faroe Islands. He began his work while a student in the Copenhagen University, from which he was graduated in 1890. Three years later he published an article on 'The Influence of Light on the Skin,' which aroused general attention because of his assertion that small-pox could be cured by the red-light treatment. This was but one application of the Finsen theory that light rays contained healing powers, and to develop the positive element of his theory he began experimenting with concentrated artificial light rays. As a result of his experiments, he effected a cure for lupus vulgaris. This cure directed great attention to the young investigator, and in 1896, the Municipal Hospital of Copenhagen allowed Professor Finsen several small buildings on its grounds in which to carry on his experiments. The Danish government then became interested in the support of the institution, and this support enabled the institute to be removed to Rosenvaenget, a suburb of Copenhagen, where under the direction of Professor Finsen, with a staff of scientists of national repute, expert electricians, and trained nurses, many cures of cases previously deemed incurable were made. In December, 1903, Professor Finsen was awarded the Nobel prize. For several years he had suffered from dropsy resulting from heart disease, but so intense was his devotion to his work that he hardly spared time from his studies for sleeping and eating, much less to recuperate his health. His death is attributable to an aggravation of the diseases from which he had suffered during his entire adult life by reason of his persistent overwork.

Leprosy.—In an article in the *British Medical Journal* under date the 17th of last month, Dr. T. J. Tonkin, late Medical Officer Hansa Association Central Soudan Expedition writes as follows on the curability of this disease :—

'For myself I have no hesitation in saying that I believe leprosy to be a disease that often yields to the influence of improved circumstances, whether that improvement be the result of wise supervision in an institution or a fortunate course of events outside.

'In this respect, leprosy closely resembles tuberculosis. There are few who would care to dispute the fact that many recover from the latter disease. One has only to

have the opportunity of following a series of autopsies to know that the lungs of a considerable proportion of persons who die at advanced years, and of ailments in no way connected with tuberculosis, present, on examination, evidence of pre-existent tuberculous disease. The slowly calcifying caseous focus, or the fibroid patch, shows that they have been so affected; but the condition of these things—the caseous focus rigidly cut off from the surrounding healthy tissue, and the fibroid patch pale and hard, when taken with the age, appearance, and history of the person in question—leave no doubt that they are but the ashes of a long-dead fire.

'What are the circumstances which, in any given instance, have determined this course of events we can, as a rule, only speculate. This much, however, we can usually be sure of, that at some time or other, when the person was in a lowered condition from poverty, business worry, previous illness, vicious courses, or any other of the hundred-and-one everyday things that depress our vitality, he was exposed to the infection of tuberculosis. The man's extremity was the bacillus's opportunity. As a result he became the subject of definite tuberculous disease. Then, after a period of dejection of mental and physical powers—a period during which the disease made headway—something happened, and the tide turned. Perhaps it was a rise in wages that determined it, or the removal of some source of trouble; but, whatever may have been its particular nature, it was something that lifted the man up again—allowed his vital forces to rally, and helped them to face and defeat the invading influence. Unfortunately, these vital forces, however thoroughly they may be reawakened, are often unequal to the task of repairing the actual damage done by the operations of the invader; but they can, and do, bottle it up and strangle and starve it, so that in time, from being a centre of action hostile to the system, it becomes a mere passive encumbrance—in the way, perhaps, but more or less powerless for evil. You may call such a man phthisical if you like, and if you happen to have known the nature of his previous malady; but if febrile reaction, emaciation, night-sweating, cough, and bacillus-laden expectoration have left him, and his capacity for work and pleasure has returned, you may call him what you like; you will not make him a sick man or a danger to the community.

'It is much the same with leprosy. Since the days of Moses leprosy has been regarded as incurable, and the word "incurable" has in this instance acquired the force of a formula conveying the idea of a thing incapable of betterment—past help, hopeless. But there are other ways of reading the word. Incurable leprosy certainly is in the sense that we do not at present possess—and possibly never may possess—a remedy that affects its course as dramatically as mercury and the iodide of potassium affect that of syphilis, or as antitoxin affects that of diphtheria. But it is difficult to regard it as incurable in any other sense. The course of events I have just sketched in connection with tuberculosis is often followed by leprosy. The disease, contracted is the result of an exposure to contagion rendered effective by the depressing influence of adverse circumstances, is often recovered from when those circumstances are removed. The application of a knowledge of this eminently natural course of events is what I call intelligent treatment of leprosy, and its successful issue I call cure. Leprosy is a disorder of which every grade exists. In any endemic area where one person suffers severely, many are subject to slighter degrees, from which they may recover without doing more than, or in some cases even so much as, suspect the nature of their malady. And among those who take the disease more severely the supervention of some improvement in their circumstances almost always betters the condition of the individual, and in an appreciable proportion of the cases abolishes the disorder.

'One of the greatest obstacles to the recognition of the true state of affairs with regard to this matter has undoubtedly been an imperfect understanding of the actual condition of many persons supposed to be lepers. To the average individual, whether medical or lay, a person with no fingers or toes and an abbreviated nose is a leper, no matter what his condition of health may be otherwise. But a man is not necessarily still a leper because he happens to be mutilated.

'The figures of any table arranged to illustrate the duration of the disease will help to make this clearer. I quote one of my own because I am best acquainted with it. The table I allude to gives in periods of five years the time that in each of 220 cases had elapsed since the onset of the disease. The average period over which fatal leprous disease extends does not usually exceed a dozen years. The last figures I had to do with in connection with this matter gave ten as an outside limit. To give the thing fullest play, let us make it fifteen. If a person have survived the invasion fifteen years, it is highly probable that his disease will be in an exceedingly quiescent condition, while if twenty have elapsed the signs will often be of so indefinite a nature as to defy recognition. Of the 220 cases I have just quoted, 24 per cent had survived the fifteen years' limit, while 8 per cent had left the date of invasion periods, varying from twenty to fifty-five years, behind them. There are exceptions, of course ; but in a large number of these cases it will be found that all specific leprous manifestations have been left behind also. Their effects may remain; naturally the fingers and toes that have been lost will not grow again ; but you can no more reasonably, on that account, look on a man as suffering from leprosy when he may have enjoyed previous to the date of his examination anything from five to fifty years of unbroken health, and when his capacity for labour is only limited by the destruction of tissue resulting from the pre-existent disease, than you could reasonably regard the man with the calcifying focus or fibroid patch as necessarily suffering from tuberculosis.

'At this point in the discussion of the subject, the objection is often made that it is impossible to be sure that any given individual is really cured. It is suggested that, although he may seem to be cured, it cannot be regarded as certain that he has no lepra bacilli inside him. I readily concede this. But I do not see any pressing necessity for knowing whether he has lepra bacilli inside him or not. He may have them in him—indeed, I should say there is little doubt he very often has—and yet he may not be suffering from leprosy. The presence of lepra bacilli in a man's tissues does not necessarily make that man a leper. The term "leprosy" is only properly applied when it is used in connection with the reaction that takes place between the constituents of the bacilli and those of the tissues they invade. While that reaction is in being the individual affected is suffering from leprosy ; as long as it is in abeyance, or after it has died down, it cannot be considered that he is. If some bacilli are there—and in a recent letter I am informed by Dr. Hansen that he has found them in the spinal cord fifty years after invasion—they are there on much the same terms as such tubercle bacilli as may remain in a caseous focus of long standing. In appearance and reaction to the various stains they may be indistinguishable from the organism in an active state, but their vitality is nevertheless open to doubt, and their influence under the circumstances in question is almost certainly *nil*. It is probable that, for the time at least, they are negligible quantities. It cannot matter much whether they are there or not. If the man be devoid of the signs and symptoms of the active disease, if his organs are performing their functions in an ordinary fashion, if he enjoy life and can work, I hold it is rational to look on that man as hale, and if the accessible fluids of his body are free from bacillary pollution he can hardly be regarded as a danger to the community.'

'That in this sense leprosy is curable there can be little doubt, for many individuals of this description are living. It is important to recognize the curability of the disease, for if this fact is not recognized a community will not be apt to look with favour on an asylum for lepers which discharges its patients. If this disease is considered incurable, it is not likely that any educational movement will be instituted to correct the prejudices of the people. Again, the patient himself, in the institution, believing himself to be beyond hope, will not avail himself of any of the aids which in the early stages of the disease offer such golden opportunities for treatment. Owing to this general belief, large numbers of leprous persons are rendered ineffective as wage-earners. Taken early it is possible that the man can not only be

cured, but that he will be able to go back again to take his original place in the world. The writer finally speaks of the responsibility of the medical profession in this matter, which he believes is not small.'

Mr. Jonathan Hutchinson in discussing Tonkin's paper said he had himself long ago taught that there was a natural tendency to cessation of all active processes if the patient lived long enough, and that in this respect leprosy resembled tuberculosis. That its active stages were self-terminable was part of the definition of leprosy which he had recently given in the *Clinical Atlas* of the New Sydenham Society. Its closest analogy was, he believed, with lupus erythematosus, a malady which after a few years' activity always tended to spontaneous cessation. He was now in a position to assert as to leprosy that in the cases in which recovery had taken place there was usually no tendency to relapse. The bacillus appeared to exhaust its soil and to be incapable of indefinite prolongation of its life. He had seen cases in which a period of fifteen or even five and twenty years had passed since the disease was apparently cured and in which there had not been the slightest return. Such patients usually regained good health. Nor was it only in slight forms or in the maculo-anaesthetic type that recovery ensued. A case which he had brought before the Medico-Chirurgical Society in 1878 was an example of recovery from a severe tubercular form, and he might now add respecting that case that the patient remained in good health many years after the date of publication of her case. Mr. Hutchinson here produced some photographs of a well-marked tuberous case in which recovery was in progress. In connection with it he took occasion to remark that the influence of chaulmoogra oil in expediting the recovery appeared to have been very definite. The result of his inquiries in India had been to greatly increase his estimate of the value of this oil, and he was inclined to rank it as far superior to all others. It appeared to possess real power in arresting the vitality of the bacillus, and he would strongly urge its more extended trial, not only against leprosy, but against its close congener, tuberculosis. It was a remarkable fact, if the proposition were accepted that leprosy was a spontaneously curable disease, that the opposite opinion should have been so generally prevalent. There was, however, he believed, a very simple clue to the apparent discrepancy. Leprosy was incurable and for the most part fatal if the patient remained in the country in which it had originated ; it was curable if he left it. It was from Norway that we got the strongest expressions as to uselessness of all drugs and the incurability of the disease. There it was said that cases of apparent recovery in hospital relapsed when sent home. The explanation was simply that, in returning home, the patients returned to the dietary which originally caused the disease. They resumed a dietary which consisted largely of fish, and it could not be wondered at that they relapsed. Although probably it was only fish in certain peculiar conditions which could originate leprosy, yet when once the disease was established, almost all forms of fish might tend to feed it. Many observers had noted that fish food made leprosy worse. All observations as to the curability of leprosy and as to the influence of drugs upon its course were, he believed, quite valueless unless abstinence from fish were enforced. In Norway, where the peasants live on fish, and fish was supplied in the asylums, the disease was severe, and was held to be incurable ; in India and Ceylon, where fish was not abundant, it was mild and often curable; in Natal, where no fish was to be had, it did not spread, and was for the most part mild, and followed by recovery.

Dr. Smith, your officer at Tracadie, writing to me on this subject says: In L'Ameque and in Pointe Marcil, our only leprous districts, the people select inferior codfish—fish that have been eaten down the back by maggots—as their winter food, selling the good fish to the merchants.

In opposition to this asserted connection between the eating of tainted fish and leprosy, Dr. H. Trail Skae writes as follows :—

'Mr. Jonathan Hutchinson is reported, in the *British Medical Journal of* September 26, 1903, pages 702-3-4, as saying : (1) That certain communities, in-

cluding Orkney and Shetland, engaged in fishing formerly suffered greatly from leprosy ; (2) that in Orkney and Shetland the disease underwent gradual extinction without the assistance of segregation laws ; (3) that the methods of curing fish have greatly improved ; (4) that no tainted or decomposing fish is now eaten in any part of the British Isles ; and he gives the last two points as sufficient reason for the second.

'So far as Orkney and Shetland are concerned, I venture to entirely dispute the accuracy of the statements 3 and 4, and more particularly the latter.

'In Orkney and Shetland fish still forms the staple article of food. At the present day it bulks more largely in the diet than it did generations ago, when large quantities of wild fowl were consumed. And of this fish a very large proportion can only be described as tainted or decomposing.

'"Skate" are usually simply cleaned and then hung in the open air, exposed to all kinds of weather, and never properly dried. They commonly hang for weeks—sometimes longer—until phosphorescent, sour, and almost unapproachable, a slice being cut off from time to time as required, and boiled for a period rarely exceeding twenty minutes. Until recently it was not uncommon to see people eating the fish in this condition without any cooking whatever.

'Sillocks and "kenithes" are soaked for days in plain water, or with a mere trace of salt, until perfectly soft and rotten. They are then cleaned and pressed, or hung in the open air—never properly dried. Vast quantities of them—known locally as "sour sillicks"—are eaten, as often as not without any cooking, in a state which would grievously alarm Mr. Hutchinson.

'Cod and haddock, caught locally or landed from passing trawlers, are left for days lying uncleaned in plain or slightly salted water, until the smell is disgusting, and the fish so soft that the finger might be pushed through them. They are then cleaned and split, salted and dried—very rarely thoroughly—in the open air.

'The salting, however, is a mere disguise, in no way preventing or curing the putrid condition, which makes itself very evident if the fish be soaked or boiled. These fish are generally eaten after being boiled for a period varying from ten to twenty minutes.

'Large quantities of cod and haddock are simply cleaned and then hung in the open air to be used as required. After a few days they become quite unmistakably putrid. They are then known as "sour cod," etc., and in this condition are greatly liked.

'I have repeatedly had "fresh" herring brought to me in a state of decomposition -- perfectly soft and putrid, but nevertheless readily eaten and much relished by the peasantry here.

'These are not exceptional cases. There are actually enormous quantities of fish in this condition eaten in Orkney and Shetland every year. I find the older inhabitants almost unanimous in the opinion that fish is not in any way better cured here now than it was fifty years ago. It is difficult to believe that it could have been much worse. Of course there is a lot of properly cured fish prepared in Orkney and Shetland, but the greater part of this goes south, while the uncured and decomposing, and the sour or badly cured fish is eaten locally.

'I am not aware of any case of leprosy having occurred in Orkney or Shetland within living memory.'

Cases of leprosy in which the disease has been cured, or in which at least all action evidences of its progress have been arrested have been also cited by Dr. Isadore Dyer, of New Orleans, in charge of the Louisiana Leper Home. And from our own Tracadie Lazaretto it has been possible to discharge under surveillance one of the patients who is temporarily at least cured to an extent that prevents his infecting any persons with whom he may come in contact.

The Chaulmoogra oil treatment has been continued during the year at the Tracadie Lazaretto with satisfactory results, all the patients benefiting by it more or less, and in addition to the lessening of tubercles and tendency to healing of ulcerations

there was a general assurance to me during my visits of inspection that they felt the stronger and better from the use of the oil.

Beri-beri.—With reference to the question as to the causation of this disease, and the possible influence of eating damaged rice, Dr. Watt, your officer at William Head, writes as follows about the British ship *Senator* : 'This ship arrived here (William Head, B.C.) 66 days out, from Cebu, P.I., with the captain ill with beri-beri, and two others of the crew convalescent from the same complaint. The first mate was reported as having died of dropsy after one month's illness, which began with him one week out from Cebu. From the history I obtained of this case, I concluded that this also was a case of beri-beri. I inquired concerning the food supply and was informed that all supplies as well as water had been taken in at old country or Australian ports. But on further questioning I found that one sack of Chinese rice had been bought in Cebu and used on the cabin table. All the cases of sickness had occurred among those eating in the cabin, so I think that this one sack of rice can be held accountable for all the trouble.'

This disease has been prevailing in the Japanese army. The wet weather fomenting the rice produced much beri-beri amongst the troops. The number of cases from June to September was nearly 16,000. Referring to this the *Journal of the American Medical Association*, on the 15th instant remarks :—

'The appearance of beri-beri (beri is Singhalese for weakness) among the soldiers now engaged in bloody conflict in the far east calls our attention to a hitherto little noticed and, therefore, so to speak, new terror of war over which medical science as yet has little or no power. Beri-beri (or kakke, as it is called in Japan) is the pest par excellence of the Malay archipelago and peninsula, but given certain special conditions, it may occur apparently almost anywhere, as witness its occurrence among Newfoundland fishermen and in British prisons. It is widely disseminated in many tropical countries, including the Philippine Islands.

'From the clinical and anatomical points of view, beri-beri may be described briefly as a peripheral neuritis, with changes in the central nervous system. Naturally, the disease may manifest itself in varying degrees of intensity ; its manifestations will also vary greatly in the different periods of its evolution. For these reasons various classifications have been proposed, and of these the one by Hamilton Wright recommends itself especially for its comprehensiveness and simplicity. Wright separates beri-beri into three principal forms, namely : 1. Acute pernicious beri-beri. 2. Acute beri-beri (running a course of from three to six weeks, leaving the patient paralyzed). 3. Beri-beri residual paralysis.

'Any one at all familiar with the clinical picture of acute peripheral neuritis and its consequences can readily reconstruct in his own mind the general clinical aspects of the second and third forms outlined in this grouping. Acute pernicious beri-beri—the first form—may terminate life quickly.

'Its main symptoms are great dyspnœa, cyanosis and cardiac failure, symptoms that indicate that in this form the process attacks specially the nerves concerned in respiration and cardiac function. In some forms of acute beri-beri there may be a pronounced anasarca (wet beri-beri), and pernicious symptoms may arise in the course of such cases even when the progress appears satisfactory. Hence the prognosis in the acute forms of this disease, especially when associated with œdema, is uncertain. So far as known, the course of the disease cannot be materially modified by treatment. The gross appearances presented by the organs after death are not strikingly or positively characteristic of any single disease, so that, without the knowledge of the clinical history, it is not likely that a correct diagnosis of acute cases would be made post-mortem without microscopic study of the nervous system, the central, and especially, of course, the peripheral. There may be more or less œdema for which it might be difficult to account in the presence of normal kidneys and normal though dilated heart. Hamilton Wright lays great stress on the presence

of congestion and erosion of the pyloric end of the stomach and of the duodenum, which are said to be constant in the acutely pernicious cases. Wright regards these lesions as the result of the localization of the unknown microbic cause of the disease, which here develops a readily absorbable and powerful neurotoxic substance.

'Wright's interesting and plausible hypothesis as to the etiology of beri-beri was discussed in these columns of *The Journal*, May 21, 1904. The hypothetical organism does not seem to have been described as yet, and it is sincerely to be hoped that this new theory does not only add one more to the long list of theories already advanced to explain the pathogenesis of this disease, which Manson says has been attributed to all sorts of causes : "to damaged fish, damaged grain; to rain, wind, heat, cold; to rheumatism, and many other things, including malaria." Still, in view of the large number of poisonous substances known to be capable of producing multiple neuritis and central nervous changes—lead, arsenic, copper, zinc, ergotin, alcohol, phosphorus, carbonic oxide and sulphide, chick-pea, bad maize, and the products of many microbic infectious agents as seen in the cases of primary and secondary infectious neuritis—it would hardly be surprising if it turned out that the term beri-beri as now used includes a variety of processes due to different causes. Certainly nervous tissues have a remarkable affinity for many harmful substances of diverse nature and origin.

'The reactions between the components of nervous tissues and such substances now demand investigation, especially from the chemical side, if we are to understand better the mechanisms that lead to such grave disturbances in the structure and function of the nervous system. All additions to our exact knowledge of neuritis of whatever cause will help to unravel the difficult problems connected with the etiology, treatment and prevention of beri-beri. At the present time progress in these directions appears to hinge largely on the determination of the question whether the disease is microbic in nature or due to faulty hygiene and bad food.'

Tuberculosis.—The Royal Commission appointed in August, 1901, and consisting of Sir Michael Foster, K.C.B. (Chairman), Professor Sims Woodhead, Professor Sidney Martin, Professor J. McFadyean, and Professor Rubert Boyce to investigate the connection between human and animal tuberculosis and to test the correctness of Koch's uttered opinions has reached certain conclusions that it feels justified in giving to the public, and which, in fact, refute the claim of the distinguished German bacteriologist. They say, according to the report : 'We have most carefully compared the tuberculosis set up in bovine animals by material of human tuberculosis, to that set up in bovine animals by material of bovine origin, and so far we have found the one, both in its broad general effects and in its finer histological details, indentical with the other.' According to the judgment of the commission, therefore, it would be unwise to modify legislative measures on the presumption that human and bovine tuberculous bacilli are specifically different or that the disease caused by the one is different from that due to the other. This is not the final official report, which will give detailed particulars, but so far as it goes may be depended on.

At the annual meeting of the Canadian Association for the Prevention of Consumption, held in this city on April 20 last, an address was given by Mazyck P. Ravenel, M.D., Assistant Medical Director of the Henry Phipps Institute, Philadelphia, on Animal Tuberculoses and their relation to Human Health. In the course of this address he said :—

'Rabinowitsch and Kempner found that ten out of fifteen cows, which reacted to tuberculin but showed no evidence of udder disease gave milk containing tubercle bacilli. They conclude that "milk may contain tubercle bacilli; first, in beginning tuberculosis, without discoverable disease of the udder; and, second, in latent tuberculosis that can be detected only by the tuberculin reaction;" also, "milk from cows that react to tuberculin must be suspected of being infectious in every case."

'Conclusion.—At the present time the weight of the available evidence is in favour of the view that the chief source of infection in children, as well as in adults,

is the human tubercle bacillus, and that the portal of entry is the respiratory tract. It has, however, been proven conclusively that the bovine tubercle bacillus is responsible for a certain proportion of the deaths from tuberculosis in children, and there is strong evidence at hand to show that the number of children infected from bovine sources is quite large. Whether the number be large or small, it is none the less our duty to guard against the use of milk from tuberculous cattle for food.

'It is without question most important to build sanatoria for the treatment and cure of early cases of tuberculosis; to form societies which spread information concerning the disease and its prevention to the sick and well alike; to build hospitals for hopeless and dying cases, in order to remove them from their homes at the period of greatest danger to those around them; to pass laws against promiscuous spitting; to regulate ventilation and over-crowding of tenements and factories; to encourage good living amongst the masses in every way possible. All of these things are useful and necessary, but we will still fail in doing our whole duty, if we neglect to guard against food products from tuberculous animals and to make every effort for the eradication of tuberculosis from cattle.'

'Maragliano has vaccinated a number of children against tuberculosis, the results constantly controlled by experiments on animals. The blood serum gradually acquired agglutinating power up to 1/100, the same as in the animals, and intravenous injection of the animals with virulent cultures of tubercle bacilli demonstrated that they were refractory, completely immune against tubercle infection. He thinks the probabilities are all in favour of the assumption that the children have been rendered similarly immune although confirmation of the test by inoculation is of course out of the question. He proceeds as for small-pox vaccination, and there is a slight febrile reaction the same as in the latter. By what he calls the "progressive" technique he commences with passive and goes on to active immunization. He first injects immunizing substances derived from the blood of immunized animals. This stage is followed by injections of these same substances plus substances derived from the bodies of killed bacilli, a material absolutely incapable of inducing infection. The third and final stage is the injection of products of the tubercle bacilli, also harmless. After a period of three to four months the serum has acquired antitoxic, antibacterial and agglutinating properties. The controls treated step by step in the same way acquire these same properties and prove completely immune to infection with virulent tubercle bacilli. The dead bodies of the bacilli are the chief factor in this vaccination, and the aim is to induce a focus of tubercular inflammation at the periphery entirely free from live tubercle bacilli. From this focus emanate the influences which induce the antitoxic, antibacterial and agglutinating properties, the reaction of defence on the part of the organism. This insures a true and special vaccination. He makes the injection in the arm as for small-pox vaccination. A small amicrobian abscess develops which is slow in healing, sometimes persisting for three or four months before completely healing. His experiences with animals have demonstrated beyond question, he believes, that it is possible to confer immunity by this simple technique. Maragliano adds that his research in this line preceded those of others by six years. Italy also took the lead in the administration of antitoxins by the mouth, as also in vaccinating man against tuberculosis. Elsewhere the question is still in the phase of mere hypothesis.'

Experiments on the disinfection of tubercular sputum.—This month's number of *Public Health*, the official organ of the Incorporated Society of Medical Officers of Health of England, says :—

'We have received Dr. Klein's report on the final results of a long series of experiments which were undertaken with a view to ascertain whether it was possibly to thoroughly disinfect the floors of public houses, &c., within the limited time available for this purpose, *i.e.*' from (say) 12 p.m. to 6 a.m. Any honest attempt to lessen the acknowledged evil arising from this source of infection must meet with the approval

of our readers, and we have therefore pleasure in commending Dr. Klein's report to the earnest attnention of all who are interested in public health; and in these days who are not ?

'It is unnecessary to dwell here upon the ease with which it is possible to demonstrate the presence of virulent tubercle bacilli in dust swept from the floors of public houses, railway carriages, etc.; this has been done by various reliable workers both in this country and abroad, as recently as January of the present year, when we took samples of the expectorated matter on the floor of a public bar in London (*v.* Public Health, p. 547, June, 1904), and submitted them to Professor Klein, who reported that he found typical tubercle bacilli in fifty per cent of the samples received!

'Realizing the gravity of this source of infection we then requested Prof. Klein to ascertain for us the best practicable method of destroying such tubercle bacilli as might be found on the floors of public houses, railway carriages, and other public places, by the use of a reliable disinfectant, and we have now the final result of the experiments he undertook to this end.

'In one sense, it is to be regretted that Dr. Klein's very satisfactory results were not obtained with a non-proprietary article. Yet a moment's reflection will suffice to show that in this, as in many other fields of research, it is to private enterprise we must look for any real progress in the future; for to what or whom else *can* we look ? Assuredly not the State !

'One feature of Dr. Klein's report appears to us to call for special comment; we refer to the manifest desire to place the question dealt with on a *practical* basis. Many investigators have shown satisfactory results with 24 hours' contact. Such results are interesting from an academic point of view, but how are they to help us when applied in actual practice? When and where is this period of time admissible? Certainly not in the problems which confront us in every-day life. Dr. Klein starts with the assumption that he has a certain limited period of time at his disposal—to wit, six hours—presumably from midnight to six o'clock on the following morning. In this we think he is well advised, for there are few situations calling for practical disinfection where provision cannot be made for this very essential condition. To run over the floor with a mop soaked in the disinfectant solution, and to "leave floor thus well moistened for a period of six hours," is at once simple and practicable, and we trust the suggestion will be widely adopted.

'Dr. Klein's report, the result of which we again commend to the attention of all who are engaged in the fight against tuberculosis, runs as follows :—

'On June 11, tubercular sputum dried on tile since June 9 was used in the following manner :—

'(*a.*) A small part of the dried sputum was injected subcutaneously into a control guinea-pig.

'(*b.*) The rest of the dried sputum was well soaked with cyllin (dilution 1 in 160) and left thus for six hours, after this it was washed and injected into two guinea-pigs—one intraperitoneal and the other subcutaneous—the amount in each case being the same, if not more than that used for the control. To-day (July 12), the control guinea-pig has big firm inguinal glands, and when killed shows internally numerous tubercles, with tubercular bacilli present in large numbers. The other medicated animals were killed and all found to be perfectly normal. From this it appears, then, that cyllin when diluted in the proportion of 1 in 160 acting on tubercular sputum for six hours at room temperature, is capable of completely disinfecting all *B tuberculosis*. For practical purposes, therefore, it would only be necessary when working with this disinfectant, to wash well with a mop the floor, presumably containing tubercle bacilli, using a dilution of 1 in 160, and to leave the floor thus well moistened for a period of six hours.

Congresses and meetings.—There has not been a meeting of the American Public Health Association within this quarantine year. The last meeting was at Washing-

ton, D.C., in October a year ago, and the next is to be held in Havana in January next.

The Canadian Medical Association held its annual meeting in Vancouver, B.C., August 23-27 last. A resolution calling for the establishment of a Dominion department of public health was again passed as I have already reported. Many important papers were submitted and discussed. The next meeting is to be held at Halifax, N.S.

Inspection duty.—Leaving Ottawa on July 8, I inspected the Leper Lazaretto at Tracadie, N.B., and the quarantines at Chatham and St. John, N.B.; at Halifax, Sydney, Louisbourg and Pictou, N.S.; Charlottetown, P.E.I., and Grosse Isle, Que., getting back to Ottawa on August 5. Leaving again on the 16th I attended the meeting of the Canadian Medical Association at Vancouver, B.C., and inspected our quarantine arrangements there and at Victoria and William Head, and on the return trip had interviews with the secretary of the Territorial Department of Health of the Northwest Territories at Regina, Assa., and with the secretary of the Provincial Board of Health of Manitoba at Winnipeg.

Trachoma from Japan.—As sanitary adviser of the Dominion government I was asked whilst in British Columbia by the Hon. Mr. McBride, Prime Minister of the province of British Columbia, to meet him, the acting superintendent of the Provincial Police, and the provincial health officer, with reference to questions relating to the Japanese immigration to that province. The officers of the United States Public Health Service stationed at Victoria and Vancouver refuse to give health certificates to enable Japanese destined for the United States to enter that territory so long as they have any symptom whatever of the disease in question. These people are consequently thrown back upon British Columbia for a temporary or, in incurable cases, a permanent, residence during which the disease may be communicated to others, and with the prospect that the incurable cases will become, from subsequent blindness, a burden upon the public funds. A report on the subject was submitted by me for the government upon my return from the coast.

National Park at Banff, Alta.—This park extends for 103 miles on the main line of the Canadian Pacific Railway, and in it are contained Canmore, Anthracite, Banff, Laggan and Field. Whilst passing through Banff, this summer, I took occasion as sanitary adviser of the government to make inquiries in relation to the appointment of a Dominion medical health officer for this National Park. The appointment of such an officer had been already recommended by Dr. James Patterson who has been acting for us in the Territories during the small-pox epidemic. Mr. Douglas, the park superintendent, with whom I had an interview, strongly urged the desirability of such an appointment, so that on the first suspicion of a case of infectious disease there might be some recognized medical officer upon whom he and others might call with an assurance that prompt and impartial action would be taken in the matter. A report on the subject was submitted by me for the government under date of the 10th ultimo.

The Quarantine Stations, &c., Grosse Isle, Que.— At this station and at its substation of Rimouski, 381 vessels have been inspected during the year, 352 at Grosse Isle and 29 at Rimouski. This shows a decrease as compared with last year, due in part to the late opening of navigation in the St. Lawrence this spring, and in part to the ever increasing size of modern vessels, one such sometimes replacing two or more of the older smaller ones, 70,111 persons were inspected.

Twenty-three vessels arrived with infectious disease.

The admissions to hospital were 237. They included cases of small-pox, diphtheria, scarlet fever, measles, enteric fever and chicken-pox.

The deaths in hospital were three.

Provision has been made by you in this year's estimates for the early addition to this station of the much needed second steamer, and for the commencement of the extension of the wharf into deep water. The most pressing present requirements are a small steam disinfector for the hospital, and an administrative building in the 'Healthy' division, to contain consulting room and surgery below and some bedrooms and small wards above, for non-infectious cases that cannot well be sent to an infected hospital.

The question of rebuilding the old wooden detention sheds which date from 1832 and 1847, spoken of in my two last annual reports is becoming more and more deserving of your consideration as each year passes by.

Halifax, N.S.—Vessels inspected, 233; 46,715 persons were inspected.

Six vessels arrived with infectious disease.

One death occurred at the station, from broncho-pneumonia secondary to measles.

As I reported last year, the pressing wants of this station are the electric lighting of the station, and the erection of a winter hospital as is now being done for St. John, N.B.

St. John, N.B.—Vessels inspected, 204. Persons inspected, 20,596. Admissions to hospital, 37. Deaths, none. Persons vaccinated, 252.

Owing to the increasing growth and importance of this port additional detention buildings, and a suitable winter hospital are being erected, and an acetylene gas plant is being installed.

A deep water wharf continues to be the most pressing want of this station.

Sydney, C.B.—Vessels inspected, 69. No infectious disease has reached this port this year. The wharf being now built at the Point Edward quarantine station will be a valuable and much needed addition.

Louisbourg, C.B.—Vessels inspected since the inauguration of this station in January last, 17; persons inspected, 422. This station will now require at least the minimum equipment of wharf, disinfector, and hospital on approximately the same scale as those at Sydney.

Chatham, N.B.—Vessels inspected, 55. No infectious disease found during the year.

Charlottetown, P.E.I.—Vessels inspected, 48. No infectious disease found during the year.

In consequence of an outbreak of small-pox in Cape Breton, inspection of all vessels arriving from Pictou was carried out from April 7 to May 17 last. Some repairs were made to the hospital.

The road leading to the station passes for some distance along the water's edge. The shore front is being worn away by the action of the waves, and on the other side the road is reported to be gradually encroached upon by the moving out of the fences by the adjoining farmers. Between the two causes the road threatens to become impassible. The Department of Justice has been requested to look into the case for the Crown.

William Head, B.C.—Vessels inspected, 308. This is a smaller number than for some years past. This is due in part to the war in which Japan is engaged which has led to the fortnightly service of the Nippon Yusen Kaisha being discontinued as the vessels have had to go into the home transport service, and in part to the ever increasing size of modern vessels leading to the carrying of the same or even greater tonnage in fewer bottoms. Persons inspected: cabin passengers, 10,439; steerage passengers, 15,705; crews, 20,150; total, 46,294. Of the steerage passengers, 5,061 were

Chinese, and 2,745 were Japanese, other Asiatics numbering 417. Of the crews, 5,517 were Chinese, and 1,086 were Japanese.

On account of the prevalence of plague in the ports of departure the special examination (including temperature and glandular regions) has been continued throughout the year.

On three steamers cases of enteric fever were found, and three cases of beri-beri in the convalescent stage on a sailing vessel. Two suspicious cases were landed for observation and bacteriological examination and held until ascertained to be non-infectious.

A new and suitable steamer to replace the *Earl* is one of the most pressing needs of this station. Towards this you have already secured a partial preliminary appropriation.

Victoria, B.C.—Number of foreign coasting vessels touching this port, 847; number inspected, 4. No infectious disease.

Vancouver, B.C.—Vessels inspected, 7; no infectious disease.

Temporary Frontier and Coast Inspection.—In addition to these regular stations, you have this year given the country the additional protection of extra inspecting officers at the following points, where peculiar threatening of small-pox, or the reported lack of effective health organizations, to the south of them, seemed to make the importation of small-pox most to be feared: in Cape Breton, Louisbourg; in Nova Scotia, Yarmouth and Canso; in New Brunswick, McAdam Junction, Edmunston, Houlton (Debec Junction), and St. Stephen; in Ontario, Sault Ste. Marie, and Rainy River; in Manitoba, Sprague, Morden, Crystal City, Killarney, and Deloraine; in British Columbia, Northport (for Rossland and Nelson), Grand Forks, and Greenwood.

In addition, extra special inspections were temporarily made at Georgetown and Charlottetown, P.E.I., of vessels from Pictou on account of an outbreak of small-pox in Cape Breton; and at British Columbia ports of vessels from Alaska during a short outbreak of that same disease in Juneau and Ketchikan.

The North-west Territories.—Small-pox in the Territories this year has been of a more severe type than in last year. Of the cases reported the same note as that of last year is to be repeated, that none were Mennonites, Galicians, or Doukhobors.

Dr. James Patterson, your very efficient public health officer in the Territories, reports that during the last ten weeks he has not had a single new case reported and that he does not know of one case in the North-west Territories. He gives it as his opinion that the epidemic is at an end; for this season at least.

The Yukon Territory.—There have not been any cases of the major infectious diseases during this year in this Territory.

Leper Lazaretto, Tracadie, N.B.—There are now at this institution, 15 inmates, ten males and five females. One less than at this date last year. There have been four deaths during the twelve months and three new cases have been admitted. Four of the patients have lost their eyesight, one from repeated attacks of iritis, the others from leprous infiltration and ulceration.

As referred to above under the heading of Leprosy the use of Chaulmoogra oil has been found very beneficial.

One patient aged 41, who came into the Lazaretto in 1878, is so far cured that he can safely be, and is, allowed to be out on leave of absence, under observation.

Public Works Health Act.—Your inspector reports that at all the very many camps in the various public works throughout the Dominion, he has found the med-

ical supervision, and the hospital accommodation given, the medicines provided and the sleeping quarters for the men when housed together or in tents to be equal to, if not an improvement on, the very good conditions reported last year.

The year has been an exceptional one in the almost general absence of infectious disease amongst the men so employed.

Your inspector submits two suggestions that have been made to him by local medical officers. First: that none but vaccinated men shall be employed on the public works of the Dominion; and second: that contractors on such works shall be obliged to dig temporary wells where pure water cannot otherwise be obtained.

I have the honour to be, sir,

Your obedient servant,

F. MONTIZAMBERT, M.D.Ed., I.S.O., F.R.C.S.E., D.C.L.,
Director-General of Public Health.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 2.

(G. E. MARTINEAU, M.D.)

GROSSE ISLE, QUEBEC, October 31, 1904.

SIR,—I have the honour to submit this my annual report of the St. Lawrence quarantine service to October 31, 1904.

There were 352 vessels examined at this station during the year, being a decrease of 93 as compared with the year of 1903. This is due largely to the lateness of the opening of navigation, to a number of vessels clearing at Sydney and to the increased size of the vessels now in the St. Lawrence trade. Of the total number only 17 were sailing vessels.

The total number of persons inspected was 70,111, being a decrease of 4,125 as compared with last year.

These were divided into the different classes of passengers as follows: First cabin, 2,487; second cabin, 10825; steerage, 32,272; cattlemen, 1,738; crew, 22,312; stowaways, 477.

The number of stowaways while not as large as during last season still continues very great and the class as a rule are not what would pass the inspection of the Immigration Department if they were examined.

Infectious disease was found or reported on the following vessels arriving at this station, named in the order of their arrival: ss. *Lake Manitoba, Parisian, Dominion, Salacia, Sardinian, Southwark, Sicilian, Tugela, Tunisian, Kensington, Lake Champlain, Mount Temple, Canada, Lake Erie, Vancouver, Montreal, Ionian, Corinthian, Monteagle, Halifax, Jeanara, Bavarian and Pomeranian.*

The diseases so discovered or reported were: small-pox, scarlet fever, measles, diphtheria, chicken-pox and typhoid fever.

Small-pox.—SS. *Salacia*, Captain Mitchell, sailed from Glasgow on April 15 with 9 cabin passengers, 27 cattlemen, 43 crew and 9 stowaways, arrived at the station on May 3 with one cattleman ill with small-pox since April 22.

That case was immediately removed to the small-pox hospital at quarantine.

The captain having anchored his steamer near the station the rest of passengers and crew were landed for quarantine of observation.

We began immediately the vaccination, the disinfection of baggage, clothes, bedding, &c.

The disinfection of the steamer with sulphur, formaldehyde and bichloride of mercury being completed, she proceeded on the way upon May 1 with a new crew in charge of her.

Two new cases of small-pox were developed among the crew on the following dates: one on the 11th and the other one on the 12th, these two cases were occupying on board the steamer the same cabin as the first case landed.

Nearly all the crew proceeded to sea with ss. *Salacia* brought down to the station by another crew on May 15, and the rest of passengers and crew having completed their period of eighteen days for observation were released on May 22.

All the cases of small-pox fully recovered, and they were discharged from the hospital at quarantine and left the station on May 22.

On two occasions passengers refused to permit themselves to be vaccinated, although on several other occasions parties who had refused vaccination by the ship's surgeon consented to allow the quarantine officer to do so.

The parties that refused vaccination arrived here on the ss. *Pretorian*, August 3, and on the ss. *Lake Champlain*, September 16.

They were landed for the usual period of observation.

The total number of admissions to the hospital was 237.

The deaths numbered three, two from broncho-pneumonia, complication of measles, and one from heart failure.

Quarantine Staff.—The Rimouski sub-station was this year in charge of Dr. E. Belisle, who made the inspection of the weekly mail steamers.

Requirements and improvements.—I have to note with pleasure the fact that necessary steps have been taken so as to provide this station with a suitable second steamer for the next season, and also that a certain amount has been granted for a deep water wharf. When these two above requirements will be completed, it will bring Grosse Isle into the foremost rank of quarantine stations of the first class.

The chief requirements now are a steam laundrying disinfecting apparatus for the hospital, so as to sterilize the contaminated linens, bedding, clothes, &c., and a new building to be erected in the upper division so as to have an office, a surgery, &c., in that part.

There are still some other works, repairs, &c., absolutely necessary, the list of which is in the hands of the Department of Public Works and of our department.

All of which is respectfully submitted.

I have the honour to be, sir,

Your obedient servant,

G. E. MARTINEAU, M.D.,

Medical Superintendent, St. Lawrence Quarantine Service.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 3.

(N. E. MACKAY, M.D., M.R.C.S.)

HALIFAX, N.S., October 31, 1904.

SIR,—I have the honour to submit my annual report of this station for the year ended October 31, 1904.

The quarantine work here was uneventful during the year just closed, there being none of the graver forms of disease brought into port and only a few of the minor diseases.

We inspected during the year 233 vessels; 1,905 cabin passengers; 7,933 intermediate; 22,705 steerage; 361 cattlemen; and 13,810 crew; a total of 46,715 souls.

Minor quarantinable diseases were found on board the following vessels : ss.*Pretorian*, from Liverpool, December 28, 1903, a child sick with measles; ss. *Laurentian,* from Liverpool, January 5, 1904, one case of diphtheria; ss.*Pallanza,* from Hamburg, January 18, two cases of measles; ss. Ionian, from Liverpool, March 27, one case of measles; ss. *Dominion,* from Liverpool, March 28, two cases of measles, and the ss. *Canada,* from Liverpool, July 22, two cases of measles.

The patients ex ss.*Laurentian* and ex ss. *Pallanza* were treated in the Infectious Disease Hospital in the city. For three months from about January 1, 1904, the eastern passage was frozen over, from a little below George's Island to the big wharf at the station, consequently communication was stopped by this route for the period mentioned. For this reason we were obliged to treat the patients above named in the city infectious hospital. The only way we could get to the station during this period was by going outside the harbour and round MacNab's island, but our boat is entirely too small to go outside the harbour in winter weather. All the other patients were treated as usual at the station.

One death occurred at the station during the year—a patient ex ss. *Pallanza*—from broncho-pneumonia secondary to measles. The patient was in a moribund condition when the vessel arrived in port.

Two immigrants ex ss. *Bavarian* refused vaccination.

The following repairs and improvements were made during the year just closed:—

The hydrants were put in good repair. It is to be hoped they will now withstand our winter frost.

One third-class detention building was partitioned off into rooms for the better accommodation of immigrants.

The first-class building was reshingled as was also the sulphur dioxide house, and the roof of the hospital was repaired and two rooms in it were fixed up nicely for the reception of cabin passengers. The foundation of the store-house was rebuilt and the inside of it ceiled and half of it shelved.

Requirements.—We need an electric plant at the station for lighting the buildings, and also a good new hospital with a capable steward and matron in charge of it who would keep it at all times in readiness for the reception of patients, as well as nurse the sick.

A new steamer is urgently required with better accommodation for the crew and immigrants. The boat should be large enough to go outside the harbour and round MacNab's island to the station in winter weather. Indeed I may state that it is not safe to approach a large liner in motion with the boat we have, even in day time and with smooth water.

I have again to report that inspecting vessels at night does not help the trade of the port in the least degree. We have been roused out of bed to board vessels in the stream after twelve at night on the plea that the owners wanted to begin at once to discharge perishable freight, such as fruits, &c., only to find these vessels were not even docked at eight o'clock the following morning. I would recommend that a regulation be made limiting inspecting hours to from sunrise to sunset.

I have the honour to be, sir,

Your obedient servant,

N. E. MACKAY, M.D., M.R.C.S.,

Quarantine Officer.

The Honourable

The Minister of Agriculture,

Ottawa.

No. 4.

(J. E. MARCH, M.D.)

ST. JOHN, N.B., October 31, 1904.

SIR,—I have the honour to submit my report for the year ending October 31, 1904.

Although trade through this port is steadily increasing the average yearly increase for the past ten years being 68 per cent—there has been a large decrease during the past year in the number of vessels requiring quarantine inspection. This, I think, is accidental, and is due to the fact that, owing to the low rates prevailing for ocean tonnage, charterers have been able to find such vessels as they required largely within the district exempted from quarantine inspection —*i.e.*—at United States ports north of, and including New York.

I have inspected during the year 204 vessels ; 13,168 passengers ; 7,428 members of crews, and have vaccinated 252 persons.

Twenty-seven cases of measles, 7 of scarletina, 1 of diphtheria, 1 of erysipelas and 1 of pneumonia were treated in quarantine hospital. All recovered.

The masters of arriving vessels reported deaths on board during the voyages as follows : ss. *Lake Erie,* one death from heart failure, February 25 ; ss. *Lake Michigan,* one suicide, by drowning, March 18 ; ss. *Lake Erie,* one death from spasm of the glottis, April 9.

The ss. Lake Manitoba reported one birth four days before arrival. From the mother, who was developing symptoms of septicaemia, I removed a partially adherent and wholly retained placenta. This case was sent to the General Public Hospital and recovered.

During the year contracts have been given out for the erection at this station of a winter hospital for forty beds, two detention buildings for steerage passengers, to accommodate 250 persons each; and a small brick building to contain an acetylene gas generator and gasometer. These buildings are now being erected. The hospital and gas-works will probably be ready by the beginning of the new year. The other buildings can hardly be ready before March, 1905. When they are completed we shall have comfortable accommodation for 1,200 persons.

Under an agreement made a year ago between the Department of Public Works of Canada and the city of St. John, the latter laid a water main through and to the

foot of St. John street and around the southeastern angle of Fort Dufferin on the mainland to high water mark. This was completed early in September. At this point, under Fort Dufferin, the Department of Public Works was to make its connection, lay the pipe across the west channel 3,800 feet to Partridge Island and put down the mains on the station to the several buildings. As yet nothing has been done in this direction.

It is impossible for me to put too much stress upon the importance of completing this waterworks system. Without it any moment may demonstrate that all the money expended here in the erection of buildings and in providing equipment for the eradication of quarantinable disease has been wasted. I respectfully ask again that the work be proceeded with even in the face of approaching winter.

At the request of the Director-General of Public Health the Department of Public Works sent the dredge *New Dominion* to the station in September for the purpose of deepening the approach to the wharf. As you are aware we are not provided with such a wharf as we should have for quarantine purposes. Until the dredging was done not even a row-boat could get within one hundred feet of the wharf at low water. Now, however, as a result of the dredging, and, when a small low water landing, which the Department of Public Works has undertaken to construct at once, is completed, it will be possible to bring a small boat, barge or vessel drawing not more than three-and-a-half feet of water, to either the 'landing' or 'wharf' at any time of tide. This will be a great advantage to us as it will permit of landing the sick without transferring them from boat to boat and, eventually, out upon the beach as has been hitherto, at times, unfortunately necessary. I have already expressed my thanks to the officers of the Public Works Department who so promptly and satisfactorily made this improvement.

The question has arisen between the local Canadian inspector of immigration, and also the United States immigration officers stationed here during the winter months, and myself, as to whether it is my duty to take back into quarantine persons who have been inspected and passed by me, and who, later, while being detained in the immigration sheds at Sand Point, develop contagious disease. I have been unable to find anything in the Act which would justify me in meeting the wishes of these officers in this particular.

I make my inspections carefully; see for myself each and every passenger; remove all cases of quarantinable disease, together with all known contacts and suspects—I refer now, of course, to the minor quarantinable diseases—and, after the completion of such disinfection as may be necessary or even during its progress—having taken every reasonable precaution to protect the public health—I issue *pratique*. If two or three days or a week later, a case of measles or scarletina or diphtheria develops among these people while detained in the immigration sheds, it is not one which, under our regulations, can be transferred to the maritime quarantine station merely because the officer of the department responsible for the detention—sometimes an officer of a foreign country—thinks that the quarantine station is the best place and the quarantine officer the best man to care for the case. The acceptance of such a case, in such a way by the quarantine officer, is, prima facie, an admission that he has not properly performed his duties in the first instance. Fortunately the regulations do not require him to so stultify himself. Were, however—and it is this which has prompted me to refer to the matter—were the control of the public health in Canada consolidated under one department, such cases as I have cited might properly and without prejudice be sent at once to the nearest hospital under public health control. At St. John, that would be to the quarantine station. This would at once relieve the immigration officers, whether Canadian or foreign, having these persons in charge, and also the steamship company which is now ultimately compelled to pay for their removal and care, and, at the same time it would afford that promptness in removal and thoroughness in disinfection, and that care in treatment, which the people for economic reasons, and the patient for humanitarian ones should receive . Unfortun-

ately, so far as our practice is concerned, the idea seems to be advanced that in public health a divided control is better than a sole control, and that a multitude of officers operating under different jurisdictions, having quite different objects in view, and necessarily employing different methods, is superior to a compact, disciplined and united corps. This is not, and cannot be, true.

During the year ending to-day, 708 deaths occurred in the city of St. John. Of these, 128 were due to tuberculosis and of the 128 eleven were imported. In the United States they have scheduled tuberculosis as a quarantinable disease and require the disinfection of quarters occupied by consumptives before others are permitted to live in them. I still look forward to the time when this shall become the practice in Canada.

I desire to express my sincere thanks to the officers of your department for official and social courtesies extended to me during a brief visit to Ottawa in August.

I have the honour to be, sir,
Your obedient servant,
J. E. MARCH, M.D.
Quarantine Officer.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 5.

(H. RINDRESS, M.D.)

NORTH SYDNEY, October 31, 1904.

SIR,—I have the honour to submit my report for the year ended October 31, 1904.

The total number of ships inspected for the year ended is 69—53 steamships and 16 sailing vessels.

A fewer number of ships have been inspected at this port this year than any previous year since my appointment.

I am glad to say that no quarantinable disease has reached here from any foreign port during the year.

The wharf which is now being built at Point Edward will be a valuable and much needed addition to the station there.

The buildings are in good repair.

I have the honour to be, sir,
Your obedient servant,
HORACE RINDRESS, M.D.,
Quarantine Officer.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 6.

(F. O'NEIL, M.D.)

LOUISBURG, October 31, 1904.

SIR,—I have the honour to submit herewith my annual report for the quarantine year ending October 31, 1904.

I am pleased to say that there has been no case or cases of infectious or contagious disease.

I have examined (since January 7, 1904, the date of the establishment of this station) 17 vessels with a total number of 422 men.

I would beg leave to suggest that some provision be made to take care of any case or cases of contagious or infectious disease which might occur at any time.

I have the honour to be, sir,

Your obedient servant,

FREEMAN O'NEIL, M.D.,
Quarantine Officer.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 7.

(P. CONROY, M.D.)

CHARLOTTETOWN, P.E.I., October 31, 1904.

SIR,—I have the honour to submit my report for the year ending October 31, 1904.

No quarantinable disease was brought to this port during the past year.

Foreign vessels arriving here usually touch at some Canadian or other northern port which, under present regulations, is temporarily exempted from inspection.

By reason of the prevalence of small-pox at Sydney, Cape Breton, inspection of all vessels arriving from Pictou during the continuance of the epidemic, was deemed necessary, and was carried out under instructions from the department. This inspection began on April 7, and was continued till May 17.

There were in all 48 inspections at this station during the past quarantine year.

The hospital building has been thoroughly repaired, but repairs are still needed to the outbuildings with increased accommodation for storing, washing and disinfecting.

The roadway to the hospital along the shore front is much worn away by the action of the sea, and is also being gradually encroached upon by the continual mov-

ing out of the adjoining fences. The road should be surveyed and made safely passable.

All of which is respectfully submitted.

I have the honour to be, sir,

Your obedient servant,

PETER CONROY, M.D.,

Quarantine Officer.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 8.

(J. MACDONALD, M.D.)

CHATHAM, N.B., October 31, 1904.

SIR,—I have the honour to submit my report for the year ending October 31, 1904.

The total number of vessels inspected at this port for the year just ended is fifty-five. The number is below the average, which is due to the fact that quite a number of our ships had to enter the ports of Louisbourg and Sydney early last spring on account of encountering heavy ice in the gulf.

The caretaker's residence and hospital buildings are in good condition. An outlay of about $25 or $30 has been incurred for a boathouse, which was required to keep our boat from the sun and weather during the winter months.

The accounts for lumber, labour, etc., have not yet been handed in.

I am pleased to state that no disease of an infectious character was found on any of the vessels inspected at this port.

I have the honour to be, sir,

Your obedient servant,

J. MACDONALD, M.D.,

Quarantine Officer.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 9.

(A. T. WATT, M.D.)

VICTORIA, B.C., October 31, 1904.

SIR,—I have the honour to submit this my report on the William Head quarantine station for the year ending October 31, 1904.

During the twelve months 308 vessels were inspected. This is a smaller number than has been inspected for some years past. The falling off has been owing in part

t the war between Japan and Russia, as on this account the fortnightly service of the Nippon Yusen Kaisha was discontinued, the steamers going into the transport service when hostilities commenced. The sale, last winter, of the fleet of steamers belonging to the Northern Pacific Company was another factor in the decrease. These steamers were sold to a coasting company and ceased calling here after March last. Before the advent of the *Empress* liners, the steamers of this fleet were operated by the Canadian Pacific Railway Steamship Company, and were therefore the first in the trans-Pacific trade to Canada. The steamers which are now to take their place have not yet reached here, although one of them, the *Minnesota*, is now on the way. This steamer is one of the largest freighters afloat, and will carry more than double the cargo formerly carried by the whole fleet she is displacing.

It may be said of all the steamers now in the trans-Pacific trade that they are large, modern vessels; and that being so, it can be understood that the quarantining and disinfecting of these large vessels is a proportionately greater undertaking, and that time-saving arrangements and a complete equipment are necessary to a station dealing with such vessels. It is, therefore, a matter for congratulation that liberal appropriations have been made for William Head station, with which many much needed improvements have recently been carried out or are under way.

In regard to the number of passengers and crew inspected, the figures for them are: Cabin passengers, 10,439; steerage passengers, 15,705 (including stowaways); and of this number 5,061 were Chinese and 2,745 were Japanese, while other Asiatics numbered 417. The balance of steerage passengers were for the most part Europeans coming by boat from San Francisco. The members of crews numbered 20,150, and of these 5,517 were Chinese and 1,086 were Japanese. The routine disinfection of all steerage passengers from China and Japan and of the Asiatic members of crews has been carried out at the ports of embarkation, as was the case the previous year. On arrival here a special examination comprising inspection of glandular regions was made in the case of all Asiatics, this being done in consequence of the presence of plague in several of the ports of the Orient. There has, however, been a very great improvement in the health conditions of the various ports during the past season. The number of cases of plague in Hong Kong has been less than one-fourth of the average of several previous years. The number of cases which occurred last season was about 300. The cases of small-pox reported were few from all ports. No case of plague occurred on any steamer bound for here, and only on one steamer from China, the C.P.R. ss. *Athenian* did small-pox break out. Small-pox, however, developed amongst a number of pilgrims being carried from Jedah to Singapore by the Ocean Steamship Company's steamer *Calcas*. There were two cases, of which one ended fatally. The steamer underwent quarantine at Singapore, and had no further cases on board.

No cases of infectious disease were treated in the hospital here during the year. Two suspicious cases were landed for observation and bacteriological examination and held for some hours until ascertained to be non-contagious. On three steamers typhoid fever was found, but as the cases were being properly handled and cared for on board, they were not brought on shore for treatment. Three cases of beri-beri in convalescent stage were found on a sailing vessel from Manila, and a death occurring during the voyage was also attributable to this complaint.

During the year three steamers were disinfected at the request of the Provincial Board of Health. These were the coasting steamers, *Tees* and *Nell*, each of which landed a case of small-pox at Port Simpson, and the C.P.R. ss. *Athenian*, owing to the discovery that a second cabin passenger, who had gone ashore at Vancouver, died from black small-pox. The diagnosis was made shortly before the man's death, and some hours after he had been in the hospital where he had been sent to recover from the effects of heavy drinking. The disease was of a malignant fulminating type, and death took place before the usual rash manifested itself. Dr. Anderson, assistant medical officer, who passed the vessel at quarantine, reports that he got a statement

from the ship's officers of a case of small-pox having been landed in Kobe, the steamer being held there for disinfection in consequence. This was 18 days previous to arrival of *Athenian* here. In consideration of the disinfection as done by the Japanese authorities, and the period which had elapsed and the fact that all seemed well on inspection here, he gave *pratique*. The passenger in question was inspected with the others, and although he was slightly ailing at the time, this appeared to be from the effects of liquor. The ship's surgeon stated that he had had him under treatment for some days on that account, and because of constitutional disease. The case created considerable comment, but too much is usually expected from quarantine, and as against small-pox this can not be made entirely effective without too great an interference with travel and commerce. Another instance of how small-pox may pass through quarantine occurred with the ss. *Senator,* from San Francisco, on which a mild case of the disease escaped detection and was discovered accidentally later in Seattle when the man was undergoing hospital treatment for an entirely different complaint. This man, one of the firemen, had been on duty all the time and had not paid any attention to the slight rash afterwards found on him. This rash had been out some days from appearance of same, but was very sparse, and the hospital surgeon wrote that he could easily understand how so mild a case could escape detection in the examination which can ordinarily be given at quarantine, especially at night, as was the case when this vessel was passed.

For some weeks during the past summer vessels clearing from Alaska were given special inspection owing to an outbreak of small-pox reported from there. Beyond the first few cases, however, there was no further spread, and the inspection was discontinued. No inspection has been necessary against the neighbouring states, as the cases of small-pox which were occurring there were few in number, and the menace was not sufficient to warrant the examination of persons entering British Columbia at boundary points, as had previously been the case.

Among the improvements during the year were the straightening of the approach to disinfecting building and the connecting of this building back with the main wharf so that the track for baggage cars could be carried, as it were, in a circle. This will greatly expedite the handling of baggage and clothes to be disinfected, and will prevent the possibility of those persons who have been through the bath mingling with those who have not. Another great improvement has been the filling in of an embankment along the shore and making a good road from the disinfection building over this to connect with the other roads in the grounds. Baggage and bedding which have been disinfected can now be taken in a cart to the various buildings. This formerly had to be carried on men's backs and was the cause of great complaint. The road connecting the station with the provincial government road has been greatly improved and gravelled throughout its length. The water main has been partly renewed. A good deal of repair work has been done to the wharf, fender piles, &c., renewed. The foundations of the main hospital, steerage and saloon buildings have been repaired and covered with cement. The roof of the main hospital has been reshingled. Alterations in plumbing to prevent freezing were made at the main hospital. Some painting and some fencing were also done. A small storage battery was put in and the range lights indicating the quarantine anchorage are supplied from it after the hour when the electric plant shuts down. This battery is not very large, but it runs a few extra lights where they are most needed. It can be seen that it would be of great advantage if the capacity were increased by another set of cells. A cottage being built for the electrician is nearing completion and the lumber is on the grounds for a house for the guards. Authority has just been obtained for more furnishings, bunks, &c., for various buildings and also for several other needed improvements. These are not mentioned in detail as they cannot be carried out until the next quarantine year. It must be mentioned, however, that an appropriation has been made for a new boarding and supply steamer for William Head station. This has been greatly needed and it is to be hoped it will soon be gone on with.

The station was visited during the year by the Hon. the Minister of Marine and Fisheries, Mr. Préfontaine, the Director-General of Public Health, Dr. Montizambert, members of the Dominion Medical Association, and by Dr. Cumming, Passed-Assistant Surgeon, Public Health and Marine Hospital Service, who is the quarantine officer at San Francsico. These and other visitors during the year expressed pleasure at the appearance of the station.

The bacteriological report of my assistant is appended hereto.

I have the honour to be, sir,

Your obedient servant,

A. T. WATT, M.D.,

Supt. B.C. Quarantines.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 10.

(W. H. K. ANDERSON, B.A., M.B.)

VICTORIA, B.C., October 31, 1904.

SIR,—I have the honour to submit the following annual report of the laboratory work at William Head for the quarantine year 1903-4.

Two cases arrived during the year necessitating a bacteriological diagnosis—one a Japanese steerage passenger with an enlarged inguinal gland and one a passenger from San Francisco with a malarial history. Both cases proved to be non-quarantinable.

Tests which were made of two formaldehyde fumigators proved their efficacy.

Much new apparatus has been installed and various germs have been studied and kept alive in subcultures as a routine.

I have the honour to be, sir,

Your obedient servant,

HAROLD ANDERSON, B.A., M.B.

Medical Assistant.

The Superintendent of B. C. Quarantines,
Victoria, B.C.

No. 11.

(R. L. FRASER, M.D.)

VICTORIA, B.C., October 31, 1904.

SIR,—I beg to submit my report for the year just ended.

Number of foreign coasting vessels touching Victoria. 847
Number inspected. 4

No contagious or quarantinable disease was found on any vessel inspected.

During the year all coasting vessels touching here were exempt from inspection, except from June 20 to July 22, when owing to small-pox at Ketchikan, Alaska, vessels from there were ordered to be inspected.

I have the honour to be, sir,

Your obedient servant,

R. L. FRASER, M.D.,

Quarantine Officer.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 12.

(L. N. MacKechnie, M.D.)

Vancouver, B.C., October 31, 1904.

Sir,—I have the honour to submit this my report for the year just ended. The number of vessels inspected was seven. No case of infectious or contagious disease came under my inspection during the year.

The steamer *Athenian* inspected at William Head arrived here May 25th carrying a passenger who died that day of what was first thought to be measles, and afterwards small-pox. The steamer was returned by the province to William Head for disinfection.

I have the honour to be, sir,

Your obedient servant,

L. N. MACKECHNIE, M.D.,

Quarantine Officer, Vancouver.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 13.

(J. Patterson, M.D.)

Winnipeg, November 1, 1904.

Sir,—My monthly reports gave you the details of the various outbreaks of small-pox in the North-west Territories during the past year. This my annual report will therefore merely be a short summary.

During the past twelve months the cases occurring at various points in the Territories were : Indian Head, 2; Regina, 6; Verna, 3; Battleford, 7; Jack Fish Lake, 8; Wolsley, 3; Macleod, 1; Evarts, 1; Floating Stone, 8; Onion Lake, 4; Calgary, 38; Wetaskawin, 3; Rosenroll, 5; Edmonton, 11; Stony Plain, 4; Spruce Grove, 1; Empeys, 2; Carstairs, 3; Cayley, 4; Medicine Hat, 6; Tregarva, 5; Banff, 10; Langdon, 4; Swift Current, 2; Okotoks, 1, making a total of 149 cases.

Of these 149 cases only 6 were half-breeds, none were Mennonites, Galicians or Doukhobors.

The type of the disease has been very much more severe than in former years. There was one death at Edmonton, two at Stony Plain, one at Rosenroll, one at Wetaskawin and three at Calgary. These died of confluent or hemorrhagic small-pox. The non-fatal cases were nearly all severe discrete or semi-confluent.

The disease was introduced to the Edmonton district by an immigrant from Glasgow and to Calgary by one from near Bay City, Michigan. At the last two places to which I was called, the outbreaks were clearly chicken-pox. Only children were affected; there was an entire absence of all the initial symptoms and the recently successfully vaccinated had as copious eruptions as the unvaccinated.

During the last ten weeks I have not had a single new case reported and to-day I do not know of one case in the North-west Territories. It appears to me that the epidemic is at an end; for this season at least.

I have the honour to be, sir,
Your obedient servant,
JAMES PATTERSON.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 14.

(A. C. SMITH, M.A., M.D., C.M.)

TRACADIE, N.B., October 31, 1904.

SIR,—I have the honour to submit my annual report as physician, &c., to the Tracadie Lazaretto.

The register of the institution shows the names of fifteen inmates—ten males and five females. One of these, a man aged 41, has been for some time out on leave of absence. His case appears to be one of those rare ones in which leprosy undergoes spontaneous cure—the malady having run its course the effects alone remaining. I hold him under occasional observation.

There are several stages of the disease, which are, however, often ill-defined. Classifying the lepers in the Lazaretto we may represent the number in the first stage to be six; in the second, seven; and in the third, one. The youngest patient is 10 and the oldest 62 years of age. There were four deaths during the past twelve months; and three new cases were admitted—one from without the province. Of those on our register nine are of French, three of Icelandic, and three of English origin. Four of our lepers have lost their sight, one from repeated attacks of iritis, the others from ulcerations and leprous infiltration. Whenever practicable the patients are given light employment in and around the buildings. Some of the men go boat-sailing in the harbour.

During the year chaulmoogra oil, in combination, has been freely used by the inmates and with very beneficial effects. Even in some advanced cases the effects of the oil are very marked, the patients becoming vigorous and expressing themselves as 'feeling better and much stronger.' At each periodical examination I find tubercles, and the blotches so characteristic of leprosy, disappearing. Erysipelas, and leproic fever, both accompaniments of the disease, and a source of much distress to our

inmates in the past, are almost unknown since the introduction of the oil two years ago.

During a recent tour of investigation through adjoining parishes I found one undoubted case of leprosy. This person has not yet been admitted. I also found three persons showing suspicious premonitory symptoms. Notwithstanding this I have again to report that leprosy is rapidly decreasing here. The absolute number has become much reduced within the past few years, and the reduction in ratio to the population is still much greater.

For several years past, under an instruction from the Director-General of Public Health, I have been compiling a record from all available sources of the history of our lepers from the first known cases; the local conditions connected with them; their origin, nativity, &c. As a result of careful investigation I become more and more convinced of the communicability of leprosy through contagion. I would cite one case from these records. A young woman whose father was leprous, and who herself developed the disease after marriage, had for some time in her employ a servant girl. This girl married a young man who like herself was free from any family taint of leprosy. After her marriage she became leprous and, with her husband, went to live in the same house with her husband's brother and his family. One of this brother's children afterwards became a leper, and four more of the children subsequently became affected and died in the Lazaretto. Had the disease been as promptly segregated then as is being done to-day, the parents would have been spared the distress of seeing five of their offspring leaving them, one by one, to die of a loathsome malady, away from their house.

I had hoped to add to this report some photographs illustrative of leprosy in its different stages, and more especially of those under special treatment with chaulmoogra oil, but I have not yet been able to overcome the aversion our inmates have to being photographed.

The State of Louisiana has recently erected a lazaretto for lepers, and an expert of the United States Public Health and Marine Hospital Service has pronounced it 'the equal of any hospital for lepers in the world, and superior to all in equipment and the method of treatment, except that of Tracadie, province of New Brunswick, Canada.'

I have the honour to be, sir,
Your obedient servant,

A. C. SMITH, M.A., M.D., C.M.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 15.

(CHARLES A. L. FISHER, J.P.)

October 31, 1904.

SIR,—I have the honour to submit this, my annual report as Public Works (Health) Inspector, to October 31, 1904.

Since my last report I have again covered the Dominion from the Pacific to the Atlantic oceans, and have personally inspected all public works coming under the application of the regulations in force under the Public Works (Health) Act, 1899, which have in any way been brought to my notice.

The year has again been an exceptional one in the almost general non-appearance of contagious and infectious disease among the men employed on the various public works coming under my inspection, there being only four cases of small-pox in one of the railway camps, three developing in men having lately come from the United States, two cases of diphtheria in two camps, and about fifty cases of typhoid fever distributed over the very many camps in the various public works throughout the Dominion, these developing mainly where impure water had to be used.

I am pleased to be able to again report that at the said works inspected, I found the medical supervision given thereon, the hospital accommodation and medicines provided, and the sleeping quarters for the men when housed together or in tents to be equal to, if not an improvement on the very good conditions reported last year.

The following is a detailed report of the public works which I have visited and inspected during the past year, as coming under the regulations of the Public Works (Health) Act, 1899 :—

RAILWAYS.

The number of public works of this class have not been as numerous as during the previous year, but the capacity of the most important ones has been very greatly increased and the construction camps so extended, that a largely increased average has been added to the railway mileage of Canada, and a greater tract of fine farming land opened out for settlement.

Canadian Pacific Railway.—This company has had under construction in the past twelve months, seven branches, extensions, grade reductions, and diversions in the provinces of Ontario, Manitoba, the North-west Territories and British Columbia, as against twelve in the previous year.

Having visited all of said works in my official capacity, I am pleased to report that at such visits I found excellent hospital accommodation provided, the men comfortably housed in buildings or tents, and well fed, the camps in good sanitary condition, and a duly qualified physician as medical supervisor over each section of camps.

With one exception there has been no outbreak of contagious disease, and the health of the men has been generally good.

I give below the extent and location of these seven various works.

Sudbury-Toronto Branch (Sudbury, Ont. to Byng Inlet, Ont., 60 miles.)—The contractors for this work are Messrs. Foley Bros., Larson and Company, with head offices at Wahnapitae, near Sudbury.

About 1,500 men were employed, who were distributed over eighteen or twenty camps, and were boarded and housed in tents by the contractors.

Up to the time of my inspection, the general health of the men had been good, and there had been no outbreak of contagious or infectious diseases.

I found the camps well situated, and in good sanitary condition.

A very good hospital is established by the contractors at Romford, about five miles from their headquarters, and hospital tents are on hand at the various camps in case of necessity.

F. J. Ewing, M.D., the chief medical officer of all the Canadian Pacific Railway Company's construction works in Ontario and the North-west, has made his headquarters with the contractors at Wahnapitae, and is the medical supervisor of the works, with one or more assistants.

Fort William, Ignace and Rat Portage sections—(reduction of grades Fort William to Winnipeg, Man.)—The contractors for this work are Messrs. Foley Bros., Larson & Company, with head-quarters at Rat-Portage, Ont.

There were over 1,000 men employed on this work, who were distributed over twelve camps, and boarded and lodged in tents, by the contractors.

There had been very little sickness of any kind, and the health of the men was generally good.

Tents were provided for isolation purposes, and the permanent hospital used was at Rat Portage, Ont.

The medical officers over the works were Drs. Scovill and Gunne.

Arcola—Regina Extension—(113 miles).—This work was under contract to Messrs. Foley Bros., Larson & Company, with head-quarters at Regina, Assa.

The number of men employed was between three and four hundred, who were lodged in tents and supplied with the best of food by the contractors, there being four camps.

The health of the men was exceptionally good, there being no cases of contagious or infectious diseases.

Excellent permanent hospital accommodation was at hand at Regina.

J. A. Kane, M.D., was the resident medical officer in charge of the employees.

Moosejaw—Swift Current Section—(Grade reductions).—This work was under contract to Messrs. Foley Bros., Larson & Company, with head-quarters at Morse, N.W.T.

About four hundred men were employed thereon at the time of my inspection, who were distributed over eight camps, but a large increase was to be made thereto, very shortly after, to complete the season's work.

The health of the men was excellent, no serious sickness having occurred among them.

There were a number of camps distributed along the section, at which the men where housed in tents, and boarded by the contractors, with the best of food well served.

A very comfortable hospital, with a permanent attendant, was established at Morse, and the sanitary condition of the various camps was well looked after.

A. E. Finley, M.D., was the medical supervisor of the camps, with head-quarters at Morse.

Wetaskiwin-Lacombe Extensions—(Twenty-five miles each extension).—Messrs. Foley Bros., Larson & Company, contractors.

Between 600 and 800 men were employed on these works, distributed among seventeen camps, housed in tents, and boarded on the best food by the contractors.

Four cases of small-pox developed in one of the camps on this work, three of these evidently imported from the United States, the fourth contracted in the camp by a man who was not vaccinated, and who died. Every precaution as to quarantine, &c., was carried out. The health of the men was generally good, and the sanitary condition of the camps fairly well attended to.

The permanent hospital at Calgary was used when necessary, and good hospital accommodation was provided at Wetaskiwin, and spare tents at the various camps.

H. Y. Baldwin, M.D., with head-quarters at Wetaskiwin, was medical supervisor of these works.

Clanwilliam diversion.—(Mr. J. W. Stewart, contractor).—About 85 to 100 men employed, who were housed in tents and boarded by the contractors. The camps were in good sanitary condition, there had been no cases of contagious or infectious disease, and the health of the men had been generally good.

Permanent hospital accommodation was provided at Revelstoke, B.C., on the line of work.

J. W. Cross, M.D. of Revelstoke, was the medical supervisor of the work, but no report has come to hand from him.

Pheasant Hills Extension—(This is a continuation of the branch mentioned in my last report as from Neudorf to Jumping Deer Creek, being an extension thereof).—Messers. Foley Bros., Larson & Company, were the contractors for the grading, &c., the tracklaying being done by men employed by, and under the direct supervision of, the Canadian Pacific Railway Company.

About 400 men were employed in all, and distributed over the various camps, which were kept in a good sanitary condition, the men being housed in tents, and supplied with good wholesome food by the contractors and the Canadian Pacific Railway Company.

There had been no outbreak of contagious or infectious disease, and the health of the men had been generally good.

Permanent hospital accommodation was provided at Moosomin, Assa., and temporary hospital tents on the branch.

A. T. Condell, M.D., of Elkhorn, Man., was in charge as medical supervisor, assisted by Dr. Black.

CANADIAN NORTHERN RAILWAY.

This company has had under construction during the past twelve months, eleven extensions to their lines in Manitoba and the North-west Territories, as against fourteen in the previous year.

Having visited and inspected each of the said works, I may say that I there found the regulations under the Public Works (Health) Act, 1899, being fairly well carried out, the hospital accommodation being fully up to requirements, the men supplied with the very best of food, and comfortably housed, mostly in tents, the sleeping and dining quarters, and the various camps (with one exception) being kept in very good sanitary condition, and each of the works having medical supervision by a duly qualified medical officer, each of whom was under the charge of R. MacKenzie, M.D., and C. A. MacKenzie, M.D., of Winnipeg, they being the chief medical officers of all construction work of the Canadian Northern Railway Company, and these gentlemen gave me every possible assistance towards my making the necessary inspections.

With the exception of a few cases of typhoid fever in some of the camps, there were no contagious or infectious diseases, and the general health and condition of the men were excellent.

Grandview Extension—(From mileage 300 (White Sand River) to Lloydminster and Edmonton, Alta.). This is intended to be the main line of the Canadian Northern Railway Company, and the capacity of the staff and various gangs of men have been so largely increased since my last report, that through trains are likely to be running over it into Edmonton, by the latter part of next summer.

The contractors for the grading thereof are Messrs. J. D. McArthur & Company, of Winnipeg, and for the tracklaying, Messrs. Robinson & Company.

The work is divided into several sections, each of which is being carried on by sub-contractors.

About 1,800 to 2,000 men in all were employed on the work, distributed throughout the several sections and the various camps thereof, comfortably housed in tents or lodging cars, and all well supplied with first class food by the contractors.

There had been no outbreak of small-pox in any of the camps, and with some exceptions, where there had been two deaths from typhoid fever (undoubtedly contracted from the water used) there had been no contagious or infectious diseases, and the general health of the men had been excellent.

Good temporary hospital accommodation was supplied for each section, and hospital tents on hand in case of necessity.

Five duly qualified physicians had medical supervision of the various sections at the time of my visit, viz. : Doctors Crosby, Wray, Lee, Mitchell and Snyder, since when D. B. Neely, M.D., has been added to the medical staff.

Erwood Division—(Ballasting line and tracklaying from about 40 miles northwest of Erwood to Melfort).—The tracklaying was being done by Messrs. MacKenzie and Mann, the grading work was under contract to Mr. Neil Keith. About two hundred men were employed thereon, being housed in tents and lodging cars, and supplied with good substantial food by the contractors, and the camps and cars were kept in fairly good sanitary condition. There was no outbreak of contagious disease, and the health of the men had been generally good.

An excellent building was provided at Erwood, and well fitted out for hospital purposes, and tents were on hand at the various camps in case of necessity.

W. H. Scott, M.D., was in charge as medical supervisor up to about the time of my visit, and was then replaced by R. M. Oatway, M.D.

Melfort Extension—(Grading from Melfort to Prince Albert, Sask.)—This work was also under contract to Mr. Neil Keith; the number of men employed was about 250, and the conditions given for the former section apply hereto, with the exception that there were a couple of cases of typhoid fever in the camps.

Dr. Oatway was in charge of this and the above section, as medical supervisor of both, but no report has reached me from him.

Carberry—Brandon Branch—(Grading, &c.)—Contractors, Messrs. Cowan, MacKenzie and A. R. Mann. From 100 to 200 men were employed on this work, housed in tents, and well boarded by the contractors. There had been no outbreak of contagious or infectious disease, with the exception of one case of typhoid fever, and the health of the men had been of the best.

Permanent hospital accommodation was provided for at Brandon, and tents were ready at the camps in case of necessity.

The Sanitary conditions were fairly well attended to.

Dr. Hazard, of Sidney, Man., was the medical supervisor of the work, but no report has come to hand from him.

Hartney Branch.—Two to three hundred men were employed thereon, who were housed in tents, and well boarded. No contagious or infectious diseases developed, and the general health of the men was good.

Doctors Edmison of Dunrea and Bigelow of Hartney were the medical supervisors, but no report has been received from them.

Portage la Prairie Branch.—A small body of men were employed for a short time finishing up the work of the previous year, and were well housed and boarded, and kept in the best of health under the medical supervision of Dr. Hazard of Sidney, Man.

Grunway Extension—(From Grunway to Wakopa, about 45 miles.)—This work was under contract to Mr. A. R. Mann, and was about completed at the time of my visit. About 150 men were employed thereon, and there had been several cases of typhoid fever, but the general health of the men had been good.

Dr. Edmison of Dunrea, Man., was the medical supervisor of the work, but no report has been received from him.

Hudson's Bay Branch—(Winnipeg to Oak Point.)—Messrs. MacKenzie, Mann & Co. were the contractors for this branch. About 100 men were employed in surfacing for a short time, who were all well looked after by the contractors.

There was one case of typhoid fever, which was sent to the St. Boniface hospital.

Messrs. MacKenzie & MacKenzie, M.D.'s had the personal supervision of the men on this work.

Springfield Branch—(Winnipeg to Birds Hill).—Only a very few men were employed here, all having good health, and being under the medical supervision of Doctors MacKenzie, of Winnipeg.

Swan River Branch—(Grading from Swan River to Thunder Hill, Man.).—This work was under contract to Messrs. Kennedy & Co.

Only a small number of men were employed, who were well housed and boarded by the contractors, and there had been no outbreak of serious disease among them.

G. Bruce, M.D., of Swan River, had medical supervision over the men, but their health and condition was so good, that he probably has not thought it necessary to send me a report.

Carman—Somerset Extension—(Grading from end of Carman Branch, to Somerset.)—This work was under contract to Mr. Strevel.

About two hundred men were employed thereon, who were comfortably lodged in tents, and well boarded by the contractor.

No outbreak of contagious or infectious disease had occurred at the time of my visit, and the men had generally been in the best of health.

Permanent hospital accommodation was arranged for at St. Boniface, and tents were kept at the camps in case of necessity.

R. B. Anderson, M.D., was the medical supervisor of this work.

Rossburn—Clanwilliam Extension—(Grading line from end of dump to Rossburn).—Messrs. McDonald & McWilliam were the contractors here.

About three hundred to four hundred men were employed hereon, who were divided over the various camps, lodged in tents, and supplied with good substantial food, by the contractors.

There had been no outbreak of contagious or infectious disease, with the exception of five or six cases of typhoid fever, and the health of the men was generally good, but the sanitary condition of the camps was not what it ought to have been, and the chief medical officers of the company have promised to see to that in the future.

Permanent hospital accommodation was provided for at St. Boniface, and tents were on hand at the camps for hospital use.

H. W. McGill, was the medical supervisor of this work in the early part of the season, and was succeeded by Dr. Wray, but up to the present no report has come to hand from either.

Halifax and South Western Railway—(From Halifax to Barrington).—The proprietorship of this road is in the hands of Messrs. MacKenzie, Mann & Co., of Toronto, and is about completed from Halifax to Liverpool, but as part of the construction has been done during the past twelve months, I report thereon, following with the report of the medical officer of each section.

Chester Section—(Chester to Halifax).—This section was under contract to Mr. Angus Sinclair, C.E.

A considerable number of men were employed thereon, who were well housed under sanitary conditions, and boarded on good substantial food.

No outbreak of contagious disease had occurred in the camps, and the general health of the men was excellent. This section has now been completed.

Doctors Hebe and Morse, of Chester, N.S., were the medical supervisors.

Hubbard's Cove Section—(Bridgewater to Mahone Bay).—This work was also under contract to Mr. Angus Sinclair, C.E.

Quite a body of men were employed thereon, who were lodged and boarded by the contractor, in good shape, and the camps kept in sanitary condition.

There had been no deaths nor contagious diseases.

This section has now been completed.

Thomas Verner, of Hubbards Cove, N.S., was the medical supervisor.

Bridgewater Section—(From Bridgwater to Queen's County Line).—The Atlantic Contracting Company are the contractors for this work.

From 150 to 200 men were employed thereon, all comfortably housed and well boarded by the contractors. There had been no contagious disease, and the general health of the men was good. The Marine Hospital at Lunenburg would be used in case of necessity.

The section has now been completed.

H. A. March, M.D., was the medical supervisor of the men.

Liverpool Section—(Queen's County Line to Liverpool).—The contractor for this section was The Atlantic Contracting Company. Two to three hundred men were employed thereon, housed in tents and boarded by the contractors. There had been no contagious diseases, and the general health of the men and condition of camps were good. This section was to be completed to Liverpool this fall.

F. P. Smith, M.D., of Mill Village, was the medical officer in charge, but no report has been received from him for the past year's work.

Middleton and Victoria Beach Railway—(From Middleton, N.S., to Victoria Beach, N.S., about 40 miles).—This road is being constructed by Messrs. MacKenzie, Mann & Co., of Toronto, and will connect at Middleton with the Halifax and South Western Railway. A considerable number of men were employed thereon, who were well housed and well fed by the contractors.

The sanitary conditions of the camps were all that could be desired, the men keeping in the best of health as a rule, and no contagious disease having developed. Medical supervision was under the charge of two local physicians.

Intercolonial Railway—(Double tracking from Bedford to Windsor Junction, N.S.).—Mr. Reid McManus is the contractor. There are three camps covering the work, two of them being occupied by Italians, who boarded themselves. The central camp is at Rocky Lake, and the men there are well housed and well looked after by the contractors.

About 150 men were employed, the general health of whom was excellent, there being no contagious or infectious disease, with the exception of one case of diphtheria, and the sanitary condition of the camps was good.

The work was to be completed this fall.

Joseph J. Doyle, M.D., of Halifax, was the medical officer in charge of the men.

Prince Edward Island Railway, Murray Harbour Branch—(Charlottetown to Murray Harbour).—This branch is being built by the Dominion government, and was just about completed at the time of my visit. Mr. Willard Kitchen is the contractor, with head-quarters at Murray River, P.E.I.

Many of the men were living in their own homes, but the sanitary condition of all has been well looked after, and there has never been any contagious or infectious disease on the works.

Lester Brehant, M.D., of Murray river, has had general medical supervision over the men, but no report thereon has been received from him.

CANALS.

The works of this kind carried on by the Dominion government, and coming under the application of the Public Works (Health) Act, were five.

Galops Canal—(St. Lawrence river, west of Cardinal, Ont.).—Messrs. A. E. Cleveland & Co., are the contractors.

A considerable number of men were employed who were well housed, and boarded under the supervision of the contractors, and every sanitary precaution is taken in their interest.

The health of the men has always been good, and medical officers, and a permanent hospital, are within call by telephone.

Balsam Lake Division of Trent Canal, section No. 2.—These works are near the village of Kirkfield, Ont.

Messrs. Larkin & Sangster were the contractors.

This work is about finished, only a very few men being employed, all of whom live in their own homes, but still have the supervision of J. MacKay, M.D., of Woodville, Ont., or his assistant.

Balsam Lake Division of Trent Canal, section No. 3.—These works are near Gamebridge, Ont., and Messrs. Brown & Aylmer are the contractors.

Over 100 men are employed on this work, and are under the medical supervision of A. Grant, M.D., of Beaverton, Ont.

Hospital accommodations were provided, and the health of the men, and sanitary condition of the camps, were good.

Welland Canal—(Breakwater and rock excavation).—These works are at Port Colborne, Ont., and Messrs. Hogan and MacDonnell are the contractors.

From 100 to 150 men were employed thereon; most of whom boarded and lodged in the neighbourhood.

There had been no outbreak of disease on the works, and the health of the men had been good. Temporary hospital accommodation is at hand, but cases of serious accident or disease would be sent by rail to the hospital at St. Catharines by the contractors.

The medical men of Port Colborne can be secured in a few minutes if necessary.

St. Andrew's Rapids Canal—(Lock and dam).—Messrs. Kelly Bros. & Co., of Winnipeg, are the contractors.

Very few men are employed thereon, there had been no outbreak of disease, the health of the men being generally good.

Dr. Ross, of Selkirk, was the medical supervisor of the employees.

BRIDGES.

There are only two works of this kind being constructed, as far as I have been made aware. The Quebec bridge (from Quebec to Levis). The men employed live in their own homes, or board with surrounding families, and their health has been good, no contagious disease having broken out. Hospital accommodation and medical attendance is at hand in the city of Quebec.

The Hillsborough Bridge.—This is being built by the Dominion government, from Charlottetown, P.E.I., and is to be the connecting link for the Murray Harbour branch of the Prince Edward Island railway. Mr. M. J. Heney is the contractor.

Quite a body of men were employed thereon, who were well lodged and boarded; their health has been good, and no contagious diseases have developed. Hospital accommodation and medical attendance is within easy reach at Charlottetown.

OTHER PUBLIC WORKS.

Breakwater, Depot Harbour, Ont.—(Rip-rap foundations and addition).—This work has been carried on by the Dominion government and is under contract to

Messrs. Davis, Haney and Miller. There were comparatively few men employed thereon at the time of my visit, as the work is nearing completion.

The camps being in a high and dry location, their sanitary condition was excellent. There had been no contagious or infectious diseases, the health of the employees was of the best, the sleeping and dining quarters clean and airy, and the food supplied good and well served.

C. O'Gorman, M.D., of Depot Harbour, Ont., was the medical supervisor of the men and camps.

High Level Dock and Dredging (at Sorel, P.Q.)—This work is being constructed by the Dominion government and Messrs. McAuliff, Poupore, Malone and Weddell are the contractors. There are not a very large number of men employed and they live at their own homes, or board and lodge in the surrounding neighbourhood, or on the dredges.

No regular medical officer is necessarily employed, the same being obtainable in the town of Sorel, within a few minutes. The health of all has been good.

Dock and Ice-breakers—(City of Three Rivers).—This work was being constructed by the Dominion government, and was under contract to Mr. Randolph Macdonald. A considerable number of men were employed thereon, many of whom lived in their own homes, and the remainder were well looked after by the contractors. No contagious or infectious disease had occurred, and the health of the men was of the best. A regular medical supervisor was not necessary, and, in case of necessity, the general hospital at Three Rivers would be used.

High Level Pier—(Montreal Harbour).—This work is being constructed by the Dominion government, under the supervision of the Montreal Harbour Board, and is under contract to Messrs. Malone and Poupore.

A considerable number of men are employed thereon, who live in their own homes or board out. The health of the men had been excellent, and no special medical officer is employed, that and hospital accommodation being readily at hand in the city of Montreal.

In closing this, my annual report for the past twelve months, I beg to say that it might be advisable to take under consideration the suggestion of Dr. Baldwin, of Wetaskiwin, Alta., as to the non-employment of unvaccinated men on the public works of the Dominion, and also the suggestion of D. B. Neely, M.D., of Humboldt, N.W.T., that contractors on such works be obliged to dig temporary wells, where pure water cannot otherwise be obtained, the use of impure water now being apparently the only cause of epidemics of various diseases on such works.

I deem it a great pleasure to be able to again draw your attention to the general healthfulness and excellent condition of the men and camps on said works, and to the close attention given by companies and contractors in carrying out the Regulations of the Public Works (Health) Act, October, 1899.

I have the honour to be, sir,

Your obedient servant,

CHAS. A. L. FISHER,

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

HEALTH OF ANIMALS.

REPORT OF J. G. RUTHERFORD, VETERINARY DIRECTOR GENERAL.

OTTAWA, October 31, 1904.

SIR,—I have the honour to present my annual report as Veterinary Director General for the Dominion.

In that branch of the public service under my supervision, the year just passed has been one of great interest and activity. Considerable progress has been made in the work of organizing the veterinary sanitary service of your department on lines commensurate with the rapidly growing importance of the live stock interests of the Dominion. While there is still much to be done in this direction, I think I am safe in predicting that the maintenance, for two years more, of a rate of progress equal to that which has characterized the last twelve months, will place this branch in a position to challenge comparison with any similar organization elsewhere.

The great economic value of veterinary preventive medicine is receiving each year more full and appreciative recognition by the governments of all civilized countries, and it behooves us, living as we do, in a country rich in flocks and herds, to see that our system is modern and our service efficient.

That you are fully alive to the importance of the work has been again demonstrated during the past year by the encouragement and endorsation which you have given to it, not only by your personal interest, but by obtaining from parliament additional legislation and increased money appropriations.

The public, and especially the stock-owners of Canada, are showing an awakened interest in the subject of animal health, and in most cases display an intelligent willingness to co-operate with our officers in the work of controlling and eradicating contagious disease.

This appreciation of our efforts towards improvement has naturally had a most beneficial effect upon the whole service, and I am glad to be able to report that, with few exceptions, the members of the staff have shown great interest in the work and performed their various and often arduous duties in a most satisfactory manner.

Much remains to be done before we can consider our machinery perfect, or, granting that impossible, even as perfect as we can hope to make it, but it is gratifying to be able to note a distinct improvement over the conditions existing at the date of my last annual report.

The drafting of new regulations and orders, some of which were naturally consequent on the passing of the revised Animal Contagious Diseases Act, in 1903, while many others were rendered necessary by circumstances arising from time to time, together with the constantly increasing correspondence and equally insistent executive detail of the office, have very fully occupied my time while in Ottawa during the past year.

The exigencies of the work also rendered unavoidable a great deal of travelling, as shown by the fact that in addition to numerous journeys in Eastern Canada, I was compelled to visit the North-west four times since March last, on one occasion extend-

ing the trip along the southern boundary of British Columbia and to Vancouver and Victoria.

In all nearly three months were spent in the ranching country; the details of the work there done, will be found in those divisions of this report dealing with special subjects.

Among the most important steps taken during the year, was the issuing on March 30 of a new order in council embodying carefully revised quarantine regulations regarding the importation and exportation of animals and all matters pertaining thereto.

This was rendered necessary, not only by the passing of the new Act, but by the fact that the regulations previously in force were, in many cases, inapplicable to present conditions and lacking in some most important details. Supplemented by a ministerial order placing certain much-needed restrictions on the importation of range horses from the Western States, these regulations have been found to work very satisfactorily.

Slight revision from time to time, owing to constantly changing local conditions, especially in the west, will, of course, be unavoidable.

The continued prevalence of glanders in some districts, and the appearance of a venereal diseases of horses in Alberta, rendered it necessary to ask parliament to amend the Animal Contagious Diseases Act, so as to permit of the payment of compensation for horses destroyed under certain circumstances. As you are aware, no opposition was offered to the amendment in question, which has therefore been embodied in the Act, and there marks a distinct advance in public sentiment on this question. The passage of the necessary contributory orders in council has also been obtained, and there is every reason to hope that this new departure will greatly simplify and accelerate the eradication of those diseases on account of which it was made.

As mentioned in my previous reports the system of inspecting stock for export to countries other than the United States was faulty, inasmuch as Canadian animals shipped via United States ports were permitted to leave the Dominion without having undergone examination by our officers. I am glad to say that this matter has now been adjusted, and that all Canadian animals intended for export to Europe or elsewhere outside this continent are now inspected before being permitted to leave this country.

Considerable progress has been made towards the improvement of quarantine facilities at St. John and Halifax, as well as at many points on the international boundary. A good deal more, however, must be done before these very necessary accommodations can be looked upon as satisfactory. This subject is dealt with in detail on page 14.

The Biological Laboratory connected with this branch has been found very useful in various ways.

A considerable saving is now being effected owing to the fact that all the mallein required for our work is manufactured at this institution instead of being purchased in the United States. Much more can be done in the same line, in fact the laboratory can, I feel certain, be made financially self-sustaining to say nothing of enormously increasing its usefulness in other directions by a slight addition to the staff and the erection of the much needed stable recommended in former reports. With a view to remedying the first mentiond deficiency Dr. Stork, our inspector at Toronto has at my suggestion, taken up the study of Bacteriology. It is my intention to bring him to Ottawa as soon as suitable arrangements can be made.

The report of Dr. Higgins at page 78 contains much interesting and valuable information.

The establishment last year of the station at Antigonish where, under the supervision of Dr. Pethick, there is being conducted a series of exhaustive experiments with a view to determining the exact nature and causes of Pictou cattle disease, has been fully justified by the results, even thus early obtained.

The full report of the experiments which is to be found at page 96 affords good ground for the hope that we will shortly be in a position to eliminate this peculiar malady from the list of diseases dealt with by this branch of your department.

Very few changes have been made in the personnel of the staff during the past year.

Dr. Moore is still at head-quarters where he continues to perform much important work in an eminently satisfactory manner.

In Ontario one additional inspector has been added to the regular staff, viz., Dr. Philps of Wallaceburg, who has been engaged under Dr. Perdue in dealing with hog cholera in the quarantined area and in the inspection of hogs shipped therefrom.

In Quebec no new appointments have been made. Dr. Whyte who was last year employed in Ontario has, however, been located in Sherbrooke which is one of our new quarantine stations and where he is almost constantly engaged in dealing with outbreaks of disease in the surrounding counties.

In Prince Edward Island, Dr. F. S. McDonald of Souris has been appointed an inspector principally for the purpose of dealing with Pictou cattle disease which malady has unfortunately made its appearance on the island; he is remunerated by fees.

In Manitoba, the occurrence of a few outbreaks of mange introduced by range horses has rendered necessary the appointment of several additional inspectors who, however, are paid by fees, their employment being of a temporary nature.

In this province, glanders has hitherto been dealt with by the provincial authorities, but in view of conditions there as compared with the rest of the Dominion, I would strongly recommend that an understanding be reached as soon as possible for the transference of the work to this branch.

The resignation of Dr. Hopkins in January last necessitated some re-adjustment of positions in British Columbia. It was fortunately possible to secure, by co-operation with the provincial authorities, the services of Dr. Tolmie of Victoria, as chief inspector for the province. Dr. Tolmie's high professional attainments and wide experience of live stock matters in British Columbia make him a most valuable addition to our staff while the terms on which he is engaged are such as to render the arrangement one of mutual advantage to this department and to the government of the province.

A considerable increase has recently taken place in the number of animals imported at Midway and other points in the Boundary district. This is largely owing to the improved facilities offered to immigrants and others for shipment to Alberta and other points in the North-west Territories by way of the Crows Nest Pass Railway.

In order therefore to prevent the introduction of disease, I deemed it advisable to again appoint an Inspector to guard the boundary in this district. Accordingly, Dr. C. M. Henderson was in January last, stationed at Greenwood and the Customs officers at ports of entry were instructed to utilize his services in all cases where inspection is necessary.

In this connection I may say that from information gained on my recent trip through this district, it will be necesary before next season, to station another veterinary inspector at Osoyoos as under existing conditions a considerable area of country is left without adequate protection from the introduction of disease by imported stock.

Dr. S. Hadwen of Duncan's, B.C., was, in June, appointed an inspector at Nelson, B.C., the services of the officer formerly stationed there having been dispensed with.

In the North-west Territories it has been found necessary to considerably extend the operations of the branch, and consequently, a number of new men have been enrolled in the Royal North-west Mounted Police as veterinary staff sergeants.

These additions bring the number of these officers in the force up to eighteen, including two now stationed in Yukon Territory. Eight of these are maintained by the police, while for each of the other ten, a sum of $2 per day is transferred from the

vote of this branch to that of the force. An allowance of $200 per annum is also paid from the funds of this branch to every veterinary staff sergeant on the list, except those stationed in Yukon Territory who, owing to extra living expenses there, receive $500. On representations made by the Commissioner, who last spring, pointed out that much extra work was imposed upon officers commanding districts by their having to oversee and report on the work of this branch, you authorized the payment from July 1, 1904, to each of these gentlemen, seven in all, of an equal annual bonus of $200. On similar grounds the allowance hitherto paid to the Commissioner himself, has been increased to $800, while the Assistant Commissioner in Yukon Territory receives $250 per annum.

The allowance heretofore made to Inspector Burnett, Chief Veterinary Officer of the force, has been raised to $600, on the understanding that he is to be stationed at Regina and exercise a general professional supervision over our work in the North-west Territories.

Several veterinarians have been temporarily employed as inspectors during the period set aside for the compulsory treatment of cattle in the district quarantined on account of cattle Mange.

I need not point out that these changes involve a very considerable increase in expenditure which is, in this part of Canada, still further augmented by the special measures rendered necessary for the eradication of disease, by the payment of compensation for horses and by the provision of needed quarantine premises. I am, however, convinced that these outlays are in every way justifiable and that they will eventually prove to be in the best interests not only of the North-west, but of the whole Dominion.

The enormous extent of the territory and the conditions under which animals are kept render it a matter of extreme difficulty to obtain and maintain an effective control of any contagious disease which may find a foothold. Proof of this statement is, unfortunately, not wanting at the present time and it is only by the adoption and maintenance of the most energetic and systematic measures that we can hope to achieve the eradication of the maladies already existing and prevent the introduction of others.

The duties performed by our inspectors in the North-west Territories are frequently of a most arduous character, involving long journeys and especially in winter, fatigue and exposure.

The reports sent in by some of these officers reveal the performance of an extraordinary amount of hard work. Where all have done well, it would be invidious to select individuals for special mention, although were it not for this consideration there are several names on the list which I would be glad to distinguish in this way.

HOG CHOLERA.

I am pleased to be able to report a well-marked decrease in the number of outbreaks of hog cholera.

The stringent measures adopted two years ago and the care bestowed upon carrying them out in detail, have brought about most gratifying results. Had it not been for the occurrence of a series of comparatively small outbreaks in British Columba, the figures for the year just past would have presented an even more favourable contrast to those of the preceding twelve months than they do.

So far as Ontario is concerned, it is interesting to note that not only have our efforts to confine the disease to the area quarantined in the three south-western counties, been more successful than ever before, but that even within that area its ravages have been greatly lessened.

This state of affairs is, without doubt, largely due to the systematic policy now being followed with the view of preventing the spread of contagion not only from the infected district to outside points, but from infected farms to those in the vicinity.

A number of experienced salaried inspectors are kept on duty within the quarantined area with instructions to give immediate attention to any outbreak which may be reported to them, as also to keep close watch on all farms in the vicinity of such outbreaks.

On receipt of a report of the appearance of disease among hogs an investigation is at once made, and if cholera is found to exist, all the hogs on the premises are, as a general rule, promptly slaughtered, and the carcasses destroyed. If the circumstances are such as to warrant the inspector in permitting the keeping alive of healthy hogs which have not been in actual contact with the disease, he has authority to do so, provided that such hogs are afterwards slaughtered on the premises, but no hog can, under any circumstances, be removed alive from a quarantined farm or other place. Similarly hogs which show no signs of disease, may, if fit, be slaughtered for food purposes even when they have been in contact with animals suffering from the disease.

Quarantined premises must be thoroughly cleansed and disinfected to the satisfaction of our inspectors before they can be released or any fresh hogs brought to or kept thereon.

Until August of this year, compensation was paid for all hogs slaughtered, except those referred to above as being killed for food, at the rate of one-third of the actual value for those actually diseased, and three-fourths of the actual value for those in contact but not diseased.

In virtue of the amendment to the Animal Contagious Diseases Act, made last session, the compensation now paid is at the rate of two-thirds of the actual value for all hogs slaughtered, whether diseased or in contact.

This change lessens to a considerable extent the posibility of friction between the inspector and the owner of the diseased hogs, as it leaves no room for dispute as to whther the animals dealt with are actually diseased or not.

The disease being still very prevalent in the fall of last year, I deemed it advisable, as soon as the weather became cold enough for the safe shipment of dressed pork, to forbid the movement of live hogs from the quarantined area, and an order to this effect was therefore issued on November 1.

This action gave rise to some irritation among the residents of the district under restriction, necessitating several personal visits and a good deal of explanatory correspondence. I also made arrangements for the delivery at Farmers' Institute meetings of addresses on the subject of hog cholera by Dr. Perdue and the other regular inspectors in the quarantined area. These addresses were highly appreciated by the farmers and the benefit arising from them was so apparent that a number of special meetings were held at which the subject was fully ventilated and free discussion invited.

The result of these appeals to the intelligence and public spirit of the community was most gratifying, and no further difficulty was experienced in carrying out the regulations.

With the advent of warm weather, it was thought best to relax the quarantine so far as to permit the shipment, under certain definite conditions, of fat hogs consigned to slaughter houses and packing houses for immediate slaughter, a renewal of the policy pursued during the summer of 1903. This provision came into force on March 15, and from that date up to the present 286 cars, containing 24,143 hogs, have been inspected and passed by our officers. A duplicate of each certificate issued is mailed by the inspector to this office immediately after the inspection is concluded, and steps are then taken to have the car indicated thoroughly cleansed and disinfected immediately after being unloaded and before its return to ordinary traffic. I am of the opinion that our strict observation of this detail is largely responsible for the notable diminution this year of mysterious outbreaks in other parts of the country.

I am not at all satisfied with the conditions under which the heavy transit trade in American hogs across the Western peninsula of Ontario is carried on. It appears

to me to be something more than a mere coincidence that the great majority of outbreaks occur in close proximity to the railway lines, making a specialty of this traffic. During the past year, as also in 1903, considerable attenion has been given to the condition of cars conveying hogs entering Canada at Windsor and Sarnia. It is however, quite impossible to safe-guard the trade in this way alone. Droppings from hog cars are distributed all along the track even under ordinary conditions, while the practice followed in hot weather of drenching the loaded cars with water is a most effective means of distributing disease germs, should any exist, over large areas of farming country. The excreta deposited on the track can easily be conveyed to Canadian hog-pens by the boots of men, by dogs, birds or other animals, and an outbreak may thus be easily brought about entirely without direct contact.

As a possible instance of infection arising from this source, I quote the following from a recent report by one of our inspectors :—

'I visited the farm to-day and found twenty hogs, ten of which were showing very well marked symptoms of cholera. I commenced slaughtering, on post-mortem examination the ulcerations of intestines were very prominent, in some cases the lungs were affected. I had all hogs destroyed and buried six feet deep and covered with quick lime.

The attack is of an acute character, and I think possibly contracted from hogs passing through by rail on the Michigan Central Railway. Long train loads of hogs go over that line nearly every day and sometimes stop at the siding near the farm barns for a long time to let trains pass by. I cannot conceive how the disease could otherwise be communicated, as there have been no new hogs brought on the farm for a length of time, and no other cases of cholera within six miles, and that some time ago.'

Again, as stated above, several outbreaks of hog cholera have, during the summer, occurred in British Columbia. In every case but one, the disease was traced to hogs shipped from or via Calgary. Careful inquiry conducted by myself personally, as well as by other officers, has failed to discover any trace of hog cholera either in the Calgary district or in any of the various localities in which the infected hogs originated.

In March last, however, the Canadian Pacific Railway authorities notified me that they intended to bring a train load of American hogs through Canadian territory from North Portal to Sumas, B.C., en route to Seattle, and asked for permission to unload and feed at some convenient point. Authority was granted to unload at Medicine Hat, and instructions were sent to Dr. Hargrave, our inspector there, to superintend the operation and see to the after cleansing and disinfection of the yards. Dr. Hargrave reported that the train went through without stopping and that those in charge had decided not to unload in Canada.

This apparently closed the incident, and I was therefore much surprised to find, on visiting Calgary in April, that the hogs in question had been unloaded there and that a considerable number of them were dead on arrival, while others had died in the yards. Inquiry brought out the fact that the upper decks in three cars had broken down, with of course disastrous consequences, the unloading being therefore a work of necessity and mercy. No doubt many of the hogs were smothered or otherwise mortally injured through the accident of the broken decks, but it is certainly a striking coincidence that almost immediately afterwards cholera began to make its appearance in hogs shipped through these yards to points in British Columbia as far apart as Greenwood and Victoria.

This incident, while furnishing no direct evidence, constitutes, in my opinion, a strong argument in favour of the exercise of extreme caution in the handling of American transit hogs.

The fact that the unloading of these hogs at Calgary was never reported to the department shows the necessity for a more thorough and effective supervision of stock

yards and railway traffic generally than has hitherto been possible with the staff at my disposal.

Before leaving the subject I have much pleasure in reporting that the new regulations passed in March, last, providing for the inspection of hogs imported from the United States and the certification and quarantining of all those not consigned for immediate slaughter are now being systematically enforced and that the slight friction induced thereby has entirely disappeared.

I append a statement showing the number and location of the outbreaks of hog cholera which have occurred during the past twelve months.

NUMBER of Farms Quarantined for Hog Cholera, Twelve Months, ended Oct. 31, 1904.

Province.	County or District.	Township.	No. of Farms.
Ontario	Essex	Colchester South	8
"	"	Gosfield South	2
"	"	Rochester	2
"	"	Sandwich East	2
"	"	Tilbury West and North	18
"	Kent	Chatham	2
"	"	Dover	28
"	"	Harwich	29
"	"	Howard	1
"	"	Raleigh	3
"	"	Tilbury East	11
"	Lambton	Dawn	5
"	"	Enniskillen	1
"	"	Moore	1
"	"	Sarnia	1
"	Middlesex	Caradoc	1
"	Wentworth	Barton	1
"	Collingwood District		2
"	Niagara Falls District		3
"	Sudbury District		1
Quebec	Montreal District		2
"	Quebec District		1
British Columbia			27
Total			151

TUBERCULOSIS.

No new developments regarding this disease have been noted during the past year. The policy of testing in quarantine all cattle coming from countries other than the United States as also those originating in the last named country, when imported for breeding purposes or milk production, has been consistently followed, and appears to be working satisfactorily to all concerned.

All cattle reacting to the tuberculin test, when applied by our officers or by other veterinarians acting under the control of the department, are now permanently ear-marked. The mark chosen for that purpose, viz.:—a large 'T' cut out of the right ear, is becoming well known throughout the Dominion and I am satisfied that this system will be, in itself, the means of disseminating much useful knowledge regarding the disease among breeders and stockmen.

The Royal Commission appointed in Britain to investigate the question of the transmissibility of bovine tuberculosis to the human species, has published an interim report which, as was fully expected by all those having any practical experience of the subject, shows that the two diseases are practically identical, and that Dr. Koch's contention to the contrary was not well founded.

That public interest in this subject has not been adversely affected by the alteration of the departmental policy regarding it, is shown by the fact that 2,649 doses of tuberculin have been sent out this year, as compared with 2,391 doses in the preceding twelve months, and this in spite of the fact that the number of cattle tested for export to the United States has been considerably less.

There is no doubt that the dissemination of practical information regarding the nature of bovine tuberculosis, the contributory causes which lead to its prevalence under certain circumstances, and the best methods of preventing its spread, is having a well marked effect on the public mind and that a sound and healthy opinion on the subject is being gradually formed. Very few intelligent breeders now care to admit the existence of tuberculosis among their stock, and as under the methods now followed by the department it is scarcely possible for them to conceal its presence from our officers, the majority are adopting measures for its elimination.

During the year, there were tested for export, 427 head of Canadian cattle, of which number 36 reacted.

Of those imported from Europe and tested in quarantine, 191 in number, 52 reacted, and were earmarked and listed.

Of other cattle there were tested 490, of which 96 were found to react.

It must not be forgotten, however, that the herds comprising the animals last mentioned were almost all suspected of being tuberculous, the test being asked for on that account.

GLANDERS.

In those parts of the Dominion where glanders exists, the efforts of a number of our inspectors have been almost exclusively directed to the carrying out of measures for its control and eradication. The energetic policy adopted in 1902, of dealing promptly and thoroughly with every outbreak of glanders discovered in any part of Canada, with the sole exception of Manitoba where this disease is still left to the provincial authorities, has naturally resulted in the bringing to light of many centres of infection previously unsuspected. Notably is this the case in the North-west Territories, in the country surrounding Ottawa, and in some districts in the province of Quebec.

In these localities the disease has evidently been in existence for a considerable time as evidenced by the number of cases discovered by our inspectors. Lack of information as to its true nature has been largely instrumental in spreading the contagion, with the result that it is now found in a great many different localities. It is providential that the climate of Canada is, in a marked degree, unfavourable to the spread of diseases of this class as otherwise the conditions, now existing, would be very much more serious than they are.

Glanders, however, is under any circumstances, a malady in dealing with which slackness is unpardonable and therefore every possible effort is being made to stamp it out wherever found.

The system followed for the yast two years of testing with mallein all contact horses and, after destroying clinical cases, isolating and retesting those which react in the first instance, has received a fair and thorough trial, no pains having been spared in carrying out the details, irksome and laborious as they unquestionably are.

In spite of the difficulties surrounding its actual operation, this system has much to recommend it, and could, in my opinion, be successfully operated under circumstances which would permit of a close professional supervision of the reacting animals, especially if there were an accompanying provision for the payment of compensation for horses which after a reasonable time neither ceased to react nor developed clinical symptoms.

In a 'country of magnificent distances' such as Canada, however, there is a most undesirable element of risk inseparable from leaving reactors alive for any great

length of time, it being practically impossible to accord to them that watchful care which is the only guarantee of even approximate safety in dealing with horses infected with glanders. That this risk existed, I was well aware from the beginning, but, owing to the non-existence of any provision for compensation, I was glad to adopt any policy rather than that formerly followed, which entailed either the complete ignoring of contact horses or the slaughter without compensation of reacting horses, showing absolutely no external evidence of disease.

Needless to say, the former was the course almost invariably followed, with the result that glanders was continually being disseminated by the sale and movement of contact horses.

This branch of your department was, I think, the first among similar organizations to inaugurate officially, a systematic policy of testing repeatedly all horses found in contact or to have been in contact with clinical cases of glanders.

After two years' experience, I am satisfied that the results do not justify us in pursuing it any longer.

It is my intention shortly to publish a complete report covering the whole period during which the retesting system was in force. In this report will be included full details of our experience, together with all available statistics as to the proportion of horses ceasing to react and the greatly varying periods at which this result was effected.

Meanwhile, I may state that during the year ending October 31, 219 horses were destroyed on inspection, and 1,387 horses were tested, of which 280 were destroyed, while 420 were reserved to be retested. In this same period, 164 horses ceased to react, but of these, a considerable portion were carried over from the previous year.

I am satisfied that our work in the future will be much more effective, in view of the fact that through your appreciation of the importance of controlling this dangerous disease, and the intelligent generosity of parliament, we have been enabled to advance instead of retreating.

By the amending last session of the compensation clause of the Animal Contagious Diseases Act and by the passing of the contributory glanders order of September 19, a copy of which is printed herewith, it has been rendered possible to make a long forward step in the direction of eradicating glanders.

Under the new regulations, clinical cases of glanders are destroyed without compensation, and all contact horses are tested as heretofore, but for such of the latter as react and are killed without showing clinical symptoms, compensation at the rate of two-thirds of the actual value can now be paid.

The order contains a provision that, should the owner prefer it, inspectors may isolate and retest reactors, such retests to be made at the owner's expense, and with the distinct proviso that if clinical symptoms develop, the animals will be destroyed without compensation.

These regulations have been in force for too short a time to warrant me in giving an opinion as to their practical application, but I am convinced that they will prove much more satisfactory than any plan yet tried in Canada, or, for that matter, anywhere else. There is no doubt that they would be more favourably regarded by horse-owners if they contained a provision for the payment of compensation even at a reduced rate, for clinical cases. It should be remembered, however, that a clinical case is not only of no actual value, but is a constant source of danger to all other horses as well as to its owner, his family and any other human beings who may, directly or indirectly, come in contact with the contagion.

On the other hand, as proved by our figures, many horses which react to mallein, eventually cease to show even that evidence of disease, while others, although continuing to react, do not, for a long time, develop any external symptoms, but maintain a healthy appearance and continue in good working condition.

To destroy such animals without paying compensation is undoubtedly to inflict a serious hardship on the owner, while to let them pass out of control to, in all likeli-

hood, develop acute glanders at some future time and in the hands of some unsuspecting purchaser, is an alternative, repugnant in the extreme, to any right thinking professional man.

The present regulations render such risks unnecessary and will, I think, be found most helpful in our efforts to eradicate the disease.

The expense for some time, will undoubtedly be heavy, but in the long run the new policy, if honestly and faithfully carried out will, I am certain, prove incomparably more economical than any less thorough method of combating this insidious and destructive malady.

That an active campaign is called for is shown by the following figures :—

Horses tested	1,387
Reacted	420
Ceased reactors	164
Destroyed on inspection	219
" as reactors, although not showing clinical symptoms	27
" showing clinical symptoms at first test	253

Ontario.

Ottawa city and vicinity	10
Prescott	1
Middlesex	1
Ontario	2
Cardwell	3
Peel	1
Renfrew	5
Wellington	5
Russell	2
Grey	2
Haldimand	1
Markham	2
	35

Quebec.

Quebec	1
Wright	10
Pontiac	15
Dorchester	1
Labelle	1
Richmond	5
Ste. Hyacinthe	6
Drummond	1
Verchères	3
Bagot	5
Nicolet	5
Sherbrooke	1
Vaudreuil	1
	55

North-west Territories.

Regina district	218
Calgary district	42
Prince Albert and Battleford district	95
Fort Saskatchewan district	26
Medicine Hat district	23
	404
British Columbia	2
Yukon	3

SUMMARY.

Ontario	35
Quebec	55
North-west Territories	404
British Columbia	2
Yukon	3
	499

PICTOU CATTLE DISEASE.

Since the date of my last report, considerable progress has been made in the direction of determinating the true nature and causes of this remarkable malady.

Although for many years considered by my predecessor a contagious disease, and dealt with on that basis, there has always existed a firm and widespread belief among the residents of the infected area that it was due, in some way or other, to the ingestion of the weed known as 'Senecio Jacobea,' 'ragwort,' or as it is locally termed in Nova Scotia, 'Stinking Willie.'

During recent years, investigations carried on by Dr. Gilruth, Pathologist to the government of New Zealand, have practically demonstrated that the belief above referred to is well founded and that the disease, so far from being contagious, is caused by eating the plant in question.

The malady, which is a specific cirrhosis of the liver, was found to exist in New Zealand under exactly similar conditions to those accompanying its appearance in Nova Scotia, viz.:—within definite areas in which the ragwort was found in profusion.

After a series of tentative experiments, Dr. Gilruth has at last expressed definitely his opinion that the weed is to be considered the sole cause of the abnormal conditions produced in animals feeding in districts where it prevails to any considerable extent, and which conditions constitute the malady known in Canada as 'Pictou Cattle Disease.'

Although as stated above, this theory is strictly in accordance with the views of the majority of those residents of the Nova Scotia counties affected by its ravages, the lack of absolute certainty as to the identity of the New Zealand disease, and that found in Canada, taken in conjunction with the fact that experiments conducted a number of years ago by my predecessor in office had been considered conclusive proof to the contrary, I deemed it advisable to arrange for an exhaustive trial of the whole question.

I, therefore, with your approval, established last year in the infected area, an Experiment Station, by leasing at Cloverville, near Antigonish, a farm of 200 acres, on which the disease had frequently made its appearance in a severe form. After the erection of suitable buildings, and the completing of other necessary arrange-

ments, 34 cattle were purchased, all of which, except four, were obtained in districts well outside of the area known to be infected.

These cattle were divided into two main lots each containing 16 head, the other two being used for a special experiment, as will be shown later.

Sixteen head, including four purchased within the infected area, which I may add were the property of the owner of the station, were housed in an old stable in which no fewer than 36 cattle had previously succumbed to Pictou Cattle Disease. This lot of 16 was entirely fed on food brought from the province of Quebec. Four head received a full allowance of hay with a liberal ration of grain, four, a liberal allowance of hay with a comparatively small grain ration, four a liberal allowance of hay without grain, and four a limited allowance of hay without grain, the latter being the usual manner in which ordinary cattle are wintered in the counties of Pictou and Antigonish.

Among these 16 cattle, no cases of the disease have occurred up to the present time, although by using a small isolated stable, a number of them have been brought into direct contact with acute cases of the malady purposely brought on to the premises with a view to ascertaining whether or not the disease is transmissible in that way.

The other 18 head were housed in an entirely new stable specially erected at a considerable distance from that already mentioned. Sixteen of them were divided into lots of four each, and treated as regards rations in an exactly similar way to those kept in the old stable except that the hay fed to them contained a considerable proportion of the dried stalks and leaves of Senecio Jacobea, no pains having been taken to remove this weed, as is invariably done by the more intelligent farmers of the district.

The result of this experiment is interesting, as three of the animals engaged in it have succumbed to Pictou Cattle Disease since July 19th last, full details being given in the report of Dr. Pethick (the officer in charge of the station) which may be found on page 96.

Of the remaining two cattle, one was fed on chopped ragwort alone, to which was added a small daily ration of bran, while the other was forced to subsist on oat straw, with a small bran ration. The former died of Pictou Cattle Disease on July 22, while the latter, at the date of this report, appears to be perfectly healthy.

Our experiments, therefore, so far as they have gone, appear to afford direct corroboration of the theory that the disease is due to the ingestion of ragwort, especially in view of the fact that contact experiments, which were carefully conducted, as shown by the detailed account of Dr. Pethick, were absolutely without result. The investigation has not, however, been carried on for a sufficient length of time to warrant us in making a definite announcement on the subject.

It is therefore my intention, with your approval, to continue the experiments for one, or possibly two years more. I think this course will commend itself to your judgment, especially in view of the fact that much valuable information is being secured not only regarding the causes of the disease, but with reference to its pathology, and its treatment, which latter appears to be successful to a limited degree and in incipient cases only. The cost of carrying on the work is comparatively trifling, in view of the large interests involved and the importance of securing reliable and definite knowledge regarding the prophylaxis of the disease.

For further details, I would refer you to the exhaustive report furnished by Dr. Pethick, who has shown most commendable industry and interest in the performance of his duties.

For the present, the disease is still being dealt with officially on the same lines as heretofore, except that advantage has been taken of Dr. Pethick's removal to Antigonish to utilize his services in dealing with cases occurring in that county, Dr. Townsend being still employed in a similar capacity in Pictou county.

A few cases have also occurred in the vicinity of Souris, P.E.I., where the services of Dr. F. S. Macdonald have been secured as inspector.

The following figures show the number of cases dealt with in each locality during the year, together with the amounts of compensation paid to owners :—

Nova Scotia	122	$1,416.66
Prince Edward Island	8	88 00
	130	$1,504.66

MANGE IN CATTLE.

In my report of last year, I ventured to express the hope that the measures which had been undertaken by individual owners for the suppression of mange in cattle would be successful in bringing about the eradication of the disease. As the season advanced, however, it became evident that the disease had still a firm hold and that more cattle were affected in southern Alberta and western Assiniboia than ever before.

The winter was a very severe one, particularly in the last-mentioned district, and there is no doubt that a good deal of the mortality which prevailed on the range last spring was due to the low condition and lack of hair, of many cattle affected with mange.

These facts, induced me to undertake an active campaign with the avowed object of stamping out this troublesome malady which, for the last fifteen years, has existed to a greater or less degree on our western ranges.

Being fully alive to the fact that such a campaign, to be successful, must have the hearty support and endorsation of the cattle-owners themselves, I thought it advisable to hold a series of meetings at the principal points in the infected area, at which, the whole subject could be freely discussed and a definite plan of action decided upon. Preliminary meetings were accordingly held during April at Medicine Hat, Lethbridge, Macleod and Calgary. At each of these gatherings, which were fairly representative of those most deeply interested, I pointed out the necessity for united and systematic effort and solicited the advice and assistance of those present.

The question was discussed in all its phases; the need for compulsory treatment, the most suitable season of the year at which to undertake it, the charges which might reasonably be made for treating stray cattle and those of careless or unwilling owners, the best preparations to use, the construction of vats, and many other details were gone into and fully dealt with.

I found that after the case had been fairly laid before them, the majority of the stock-owners favoured the adoption of active measures, but that they almost, without exception, dreaded to undertake the construction of vats and the expense of dipping their own cattle, owing to the danger of reinfection through the stock of others who, unless compelled, would, in all probability, neglect to do so.

After returning to Ottawa and discussing the whole matter with you, I made it my business to attend the annual meeting of the Western Stock Growers' Association, which was held in Calgary on May 12 and 13. Having submitted to the members of this important body a proposition comprising the passing of a departmental order demanding the compulsory treatment between September 1 and October 31, of all cattle within the infected area, whether actually showing signs of disease or not, resolutions were passed endorsing the proposed action and promising assistance in carrying it out.

The consent and approval of the leading stock owners having been obtained, it became necessary to secure definite information as to the boundaries of the infected area and to arrange for the extra funds needed to carry out the work.

It proved to be somewhat difficult to obtain the required information while the long parliamentary session delayed the appropriation and it was not until August 9,

that the Order was issued, leaving but a short time in which to arrange the final details.

Every means was taken to give the Order as much publicity as possible and although it is of considerable length, it was inserted as an advertisement in all the leading newspapers throughout the infected district, as well as in the agricultural journals published in Winnipeg.

Several thousand additional copies were printed for distribution and it was also embodied in the departmental bulletin, a copy of which is attached to this report.

Shortly after the Order was issued, I again went to the North-west and with the assistance of the Commissioner of the Royal North-west Mounted Police, who is in charge of the work of this branch in the North-west Territories, I arranged the details of the organization without which, it would have been impossible to carry out the scheme.

The infected area was divided into thirteen districts, each of which was placed in the charge of a qualified veterinary inspector, with authority to engage as many deputy inspectors as might appear to be necessary, for the effective enforcement of the Order.

Arrangements were also made for the supply of the necessary ingredients of the two preparations authorized by the Order. In this connection considerable difficulty was experienced in obtaining a sufficient supply of sulphur, but this problem, like most of the others connected with the scheme, was in the end, solved in a fairly satisfactory manner.

The attitude of the great majority of the stock owners was all that could be desired. Dipping vats were constructed in many different localities, the total number built during the season, including those erected by the department at Wood Mountain, Pendant d'Oreille, Coutts and Cardston was 196.

Very few districts, and those of comparatively small area, were exempted from the operation of the Order. Such as were exempted comprised, as a rule, small herds held by themselves closely under fence, and which had never been affected, nor in contact with, diseased animals. In a few instances, larger districts on the outskirts of the infected area and separated from it by well defined natural boundaries, were also exempted after careful investigation by the Veterinary Inspector in charge.

Some difficulty was experienced with small owners, who failed to understand the necessity for the universal and simultaneous treatment of all cattle within the infected area. A number of individuals of this class claimed exemption on the ground that their cattle showed no signs of infection, forgetting that the disease, to a large extent, is quiescent in the summer and fall, and that many cattle, although actually infected, do not develop symptoms until after the setting in of cold weather.

I am glad to say, however, that the majority even of this class of owners, became reconciled to the Order before the expiry of the time set for its enforcement. A few, however, held out, and by neglecting to make proper provision for treatment before the mild weather came to an end, managed to avoid compliance with the regulations. Instructions have been issued to our officers to closely quarantine all cattle not treated except where legal exemption was granted. This rule is also being applied to the cattle of a few large owners who, against their own interests, insisted on using dipping preparations other than those authorized by the Order. Some little harm was done by the canvassing agents of firms manufacturing patent dipping preparations who endeavoured, by misrepresenting facts, to convince the stock owners that they were being subjected to needless inconvenience and expense by being asked to use a hot lime and sulphur dip.

In this connection I would say that it was only after the most careful and thorough study of the experience of other countries, that I determined to insist on the use of the preparation in question.

In every civilized country where systematic efforts have been made to eradicate mange, the lime and sulphur dip has superseded all other preparations. Under the circumstances, it was out of the question to permit individual owners to use formulæ not

known to be thoroughly effective and reliable. Had any latitude been shown in this respect, it would have been impossible to differentiate between the various proprietary remedies on the market, with the inevitable result that many owners would have wasted their own time and money and endangered the herds of their more intelligent or conscientious neighbours by using cheap and ineffective preparations, thus paving the way for widespread reinfection and bringing the whole system of treatment ordered by the department into disrepute.

On the whole, the results of the Order have been very gratifying. While, in view of the prevalence of the disease and the enormous size of the infected area, its complete eradication in one season could scarcely be hoped for, a very great deal of good has been effected—owners have been thoroughly roused to a sense of the importance of getting rid of the disease, and have in most cases overcome the great initial difficulty of providing adequate facilities for the treatment of their stock. They have largely benefitted by the experience of this year, having not only acquired a practical knowledge of the details of treatment, but discovered that, apart altogether from its effects in curing mange, the dipping so far from being injurious to the stock, is of great benefit in ridding them of lice and other parasites, which have hitherto done serious damage by preventing thrift and retarding the laying on of flesh.

The creation of a healthy public sentiment on this question will also be of incalculable benefit in another way, inasmuch as owners who have gone to the trouble and expense of erecting dipping plants and treating their stock will, in future, render every assistance to our officers by seeing that their more indolent or less intelligent neighbours are compelled to take similar precautions, so as to prevent reinfection of healthy animals.

The following figures will give some idea of the extent of the operations and the magnitude of the problem which had to be faced in making an honest effort to stamp out this troublesome malady, which has for so long been causing, both directly and indirectly, a large annual loss to the cattle owners of Western Canada.

411,061 cattle have been up to the present date, dipped once, while of these, 176,685 have received the second treatment called for by the order. If the weather remains open for a few weeks, it is altogther likely that all of those reported to have been dipped once will have their second treatment completed, and that a considerable additional number will still be dealt with.

To show the progress made I would ask you to compare the number of cattle treated this season, with the figures quoted in the report of the attempt made in 1899 to enforce a similar policy. During that season, 686 head were dipped at Rocky Coulee, while the Commissioner of the North-west Mounted Police reported a total of 2,018 head quarantined and treated.

I am satisfied that from this time on, there will be no great difficulty in dealing with mange. The securing of the good-will and hearty co-operation of the owners is a decided step in adavnce which will doubtless bear good fruit during coming seasons.

MALADIE DU COIT.

In March last, Inspector Burnett, Chief Veterinary Officer of the Royal Northwest Mounted Police, reported, through the Commissioner of that force, the existence of Maladie du Coit in a stallion and several mares, the property of Mr. W. T. McCaugherty, residing near Lethbridge, Alberta.

This disease, which for upwards of a century has been well known in Europe, to which continent it was originally conveyed from Northern Africa, and also, it is believed, from Asia, first made its appearance in the United States in 1882, when a brown stallion was brought from France to Bloomington, Illinois, where he infected a large number of mares, who in turn conveyed the disease to several other stallions. The prompt measures adopted by the authorities proved effective in stamping out the disease in this particular district, although, unfortunately, a number of animals were

sold before the nature of the outbreak was fully understood. Through these latter cases, the disease was conveyed to various parts of the United States, with the result that, from that time until the present, occasional outbreaks, varying in extent and intensity according to circumstances, have been reported from time to time.

Until the present season, however, Maladie du Coit, or Dourine, properly so called, has never been definitely recognised in the Dominion, although an outbreak of venereal disease, which from its history and symptoms, as described by the veterinarians who treated the affected animals, seems to have been only a severe form of the benign affection known to the profession as Coital Exanthema, aggravated in some cases by concurrent Strangles, took place in 1887 and 1888 in the county of Kent, Ontario. This outbreak was investigated by Dr. P. H. Bryce on behalf of the Ontario government, but the evidence available was not such as to enable him to arrive at any definite conclusion as to its real nature. A careful study of his report, in the light of a somewhat extended professional experience of venereal disease in horses, has led me to the conclusion already stated, viz.: that the disease then seen was not Maladie du Coit.

The facts set forth in Inspector Burnett's report on the McCaugherty cases were, however, such as to lead me to suspect that the trouble in the Lethbridge district was of a very serious nature, and I therefore lost no time in making a personal inspection of the affected animals. Some difficulty was experienced in reaching the cases owing to the breaking up of the ice in the Belly river, and it was not until April 12, that I had an opportunity of seeing the diseased horses in company with Inspector Burnett. After a careful examination, I had no hesitation in confirming his diagnosis. Recognising, however, the serious nature of the problem to be faced, owing to the facility with which such a disease is capable of dissemination among horses on the open range, I deemed it advisable to eliminate any possible doubt before adopting stringent measures.

I therefore, with your approval, asked Dr. Salmon, Chief of the United States Bureau of Animal Industry, to authorize or recommend a veterinarian, having practical experience of the disease, to visit Lethbridge for the purpose of making an examination of the cases then in hand. Dr. Salmon, very kindly and promptly, placed at the disposal of this department the services of Dr. E. T. Davison of Omaha, Nebraska, who is the inspector in charge of all outbreaks of Maladie du Coit occurring in the United States.

I had returned to Ottawa for the purpose of consulting you on this and other matters, but went back immediately to Lethbridge, meeting Dr. Davison there on May 6. This gentleman, on examination of the infected animals, had no hesitation whatever in pronouncing the disease to be Maladie du Coit, as shown by his official report, a copy of which was kindly furnished to me by Dr. Salmon. See page 69.

On obtaining this additional evidence, I immediately took such steps as, in my opinion, were best calculated to keep the disease under control, and prevent its spread among the valuable breeding herds of Alberta and Assiniboia. Dr. Hargrave, of Medicine Hat, who had, since my former visit, been engaged in inspecting all mares served by the infected stallion, and generally collecting information as to the conditions in the district, and who, I may say, was also firmly convinced that the disease with which we were dealing was actually Maladie du Coit, was present with Inspector Burnett and myself on the occasion of Dr. Davison's visit, so that I had the benefit of the valuable advice and assistance of these three gentlemen in formulating the policy adopted.

As at that time no provision existed for the payment of compensation for horses destroyed on account of disease, and as many of the affected mares were of considerable value, and their destruction, even if deemed advisable, would have involved t tremedous loss to their owners, there was no alternative but to place them in quarantine, under such restrictions as would preclude the possibility of their transmitting the disease, directly or indirectly, to others of their own species.

After going carefully over the ground, I decided on the establishment of a temporary quarantine station on the Old Man river, a short distance above McCaugherty's ranche, in which the affected mares could be kept safely under fence. After negotiating with the Department of the Interior and the Hudson's Bay Company, who owned the land required for this purpose, I was enabled to make arrangements for the fencing of some 1,800 acres, with a frontage on the Old Man river affording watering facilities.

Until the fencing of this area could be completed, I arranged with Mr. McCaugherty to keep all infected mares, whether his own property or not, inside his fenced pasture. I also engaged his services, and those of another man, instructing them to make a thorough inspection of all mares and stallions running in the neighbourhood of Lethbridge, and to secure and isolate, as above indicated, all showing the slightest symptoms of maladie du coit.

As a number of stallions were also reported to be at large on the range, I further authorized Mr. McCaugherty to collect all animals of this class, returning such as could be identified to their owners for safe-keeping, and placing the rest in charge of the officer commanding the R.N.W.M. Police, Lethbridge district.

A considerable number of stallions were taken up in this way, of which several were castrated, with the approval of their owners. I regret to say that the inspection conducted, as above mentioned, under the supervision of Inspector Burnett, brought to light the fact that a large number of mares running on the open range, were affected, to a greater or less extent with a venereal disease strongly resembling that seen in those bred to the McCaugherty horse. All of these suspicious cases were closely quarantined, the majority of them being held, either in Mr. McCaugherty's pasture or in the new quarantine ground, while the remainder were isolated upon the premises of their owners.

Under the authority of the Animal Contagious Diseases Act, 1903, the following regulations were brought into force early in the season, and every effort was made to carry them out in their entirety.

REGULATIONS RELATING TO MALADIE DU COIT.

Authorized by Order in Council dated the 8th day of July, 1904, in virtue of 'The Animal Contagious Diseases Act, 1903.'

1. Every owner, breeder or importer of, or dealer in horses, shall on perceiving the appearance of maladie du coit, among the animals owned by him or under his special care give immediate notice to the Minister of Agriculture and to the nearest Veterinary Inspector of the Department of Agriculture of the facts discovered by him as aforesaid.

2. Every veterinary surgeon practising in Canada shall immediately, on ascertaining that an animal is affected with maladie du coit, give similar notice to the Minister and to the nearest Veterinary Inspector.

3. In the Northwest Territories the notice required to be given by the two preceding sections of these regulations shall be deemed sufficient if given to the Commissioner, Assistant Commissioner, or other officer of the Northwest Mounted Police force, or to one of the Veterinary Staff Sergeants of the said force.

4. No entire horse more than one year old shall, after the passing of this order, be permitted to run at large on unfenced lands in the territory of Alberta, or in that portion of the territory of Assiniboia lying west of the third principal meridian, and any owner of horses failing to comply with this order shall be deemed guilty of a breach of these regulations and of the Animal Contagious Diseases Act.

5. Any entire horse more than one year old found running at large within the area defined above, may be seized and held on the order of any duly authorized Veter-

inary Inspector of this department, who shall forthwith when ever possible notify the owner of the said horse of such seizure, and the said horse if not claimed within thirty days of such seizure, may be castrated, and no indemnity shall be allowed to the owner in case of damage arising out of or resulting from said castration, seizure or detention.

6. No animal which is affected with maladie du coit shall be permitted to run at large or to come in contact with any animal which is not so affected.

7. Any Veterinary Inspector or other duly authorized person may declare to be an infected place within the meaning of the 'Animal Contagious Diseases Act, 1903,' any common, field, stable, or other place or premises, also any market, railway yard, stockyard, pen, wharf, railway car or other vehicle where animals are found which are affected with maladie du coit.

8. Every Veterinary Inspector or other duly authorized person shall have full power to order animals affected or suspected of being affected with maladie du coit to be collected for inspection, and, when necessary, to be detained and isolated or otherwise dealt with in accordance with the instructions of the Veterinary Director General.

9. The expenses of and incidental to the collection, isolation, seizure, castration or otherwise dealing with horses for the purposes of these regulations, shall be borne by the owners of the animals, and if advanced by the Inspector or other authorized person shall, until paid, be a charge upon the said animals.

10. No animal shall be removed out of an infected place without a license signed by an Inspector or other duly authorized person.

11. The Veterinary Director General may, from time to time, order the slaughter, castration or other disposition of animals affected with maladie du coit.

12. Every person who violates any provision of these regulations shall, for every such offence, incur a penalty not exceeding two hundred dollars.

J. G. RUTHERFORD,

Veterinary Director General.

Department of Agriculture,
Ottawa.

In order, further to meet the peculiar conditions with which the department was, for the first time, confronted, it was deemed advisable to provide means whereby, in the event of slaughter being rendered necessary, reasonable compensation might be paid to the owners of infected animals. An amendment to the Animal Contagious Diseases Act was therefore introduced and became law on receiving the Royal Assent in the prorogation of parliament on August 10. As soon as possible thereafter I proceeded to Lethbridge for the purpose of inspecting the quarantined mares with a view to having such of them as presented unmistakable symptoms of maladie du coit dealt with in a suitable manner. I was fortunate in having present at this inspection, Dr. Veranus A. Moore, Professor of Comparative Pathology at Cornell University, as also Dr. Kelly, State Veterinarian for New York, and Dr. Knowles, State Veterinarian for Montana.

As I was, at the same time, engaged in organizing for the carrying out of the Compulsory Mange Dipping Order, which involved the employment of a considerable number of the regular veterinary inspectors, as also of several other western veterinarians, I thought it advisable to make my temporary headquarters at Lethbridge, and to arrange for these gentlemen to meet me there. By so doing, I was able to largely economize time, and also to afford these officers the opportunity of examining the cases of maladie du coit, so that they might be able to recognize the symptoms if shown by horses in the various districts of the Northwest Territories to which they are from time to time called in the performance of their duties.

In all, twelve veterinary surgeons were present during the first stage of the inspection, which I may say occupied altogether a period of nine days. In this time 258 mares were carefully examined, it being necessary in every case to secure the animal in a squeezer, which, along with suitable corrals, had been erected on the quarantine ground.

In view of what I had seen earlier in the season, and of the opinions as to the nature of the disease, an expression of which has already been laid before you, I naturally expected to find at least some of the animals to have developed acute symptoms, especially as a number of the most severe cases seen in April and May had shortly afterwards succumbed.

I was therefore greatly surprised to find that, not only were there no well marked cases among those quarantined, but that many of the animals which had been apparently severely affected at the time of my previous examination, had improved in a marked degree. While, almost without exception, each of the animals examined on this occasion showed abnormal vaginal conditions, there was not among them any one case sufficiently pronounced to warrant me in ordering its destruction.

After careful consideration of the whole matter, I decided that the best and safest policy to pursue under the circumstances was to continue to hold all suspects in quarantine for a sufficient length of time to enable us to decide as to whether or not we were actually dealing with maladie du coit, or with some other, and possibly less malignant, form of veneral disease.

In reaching this decision, I was influenced, not only by the natural and reasonable aversion felt by every right thinking man to the destruction of life and property, but by the consideration that the adoption of a policy of slaughter would be an official acknowledgment by this department of the existence of maladie du coit among the horses on the western ranges, an admission which I am compelled to hesitate in making, in spite of all the evidence already advanced in its favour.

A policy of slaughter, once adopted, would have to be constantly carried out, and while this would be well enough if fully justified by facts, it would, I think, be unwise in the extreme to take even the first steps in this direction without being absolutely certain that the conclusions leading to it were unquestionably correct.

By keeping the suspected animals alive for a period long enough to fully demonstrate whether or not they are really affected with maladie du coit, the question of the existence or non-existence among Canadian range horses of this virulent malady can be settled in a much more satisfactory manner than by ordering their destruction on grounds, as to the soundness of which even the slightest suspicion can be entertained.

I have, therefore, with your consent and approval, made arrangements for the continuing of the quarantine of the suspected animals during the coming winter, in the expectation that before the advent of next spring more satisfactory evidence than that now in our possession will be available.

To those unacquainted with the literature and history of maladie du coit, it may seem remarkable that so much hesitation should be evidenced in reaching a decision, especially where so many animals are affected. As a matter of fact, however, although this disease has been known to the veterinary profession for upwards of a century, our information regarding its true nature is, even now, exceedingly imperfect.

Although researches by veterinary scientists in Europe, in Africa, and more recently still in India, have apparently demonstrated that it is due to a blood parasite resembling to a marked degree those which cause surra in Asia and magana in Africa, two of the most fatal maladies affecting horses, the presence of this specific tryanosoma has never, so far as I am aware, been detected in America, in spite of the fact that the disease seen on this continent is otherwise apparently identical with that observed in the old world.

In this particular outbreak, Dr. Veranus Moore, one of the most skilful bacteriologists in America, was unable to detect any trace of the presence of the parasite.

although he made many examinations of the blood, the vaginal mucus and other fluids taken from the mares at Lethbridge. He also carried with him to Cornell, a number of specimens and slides on which he was kind enough later to furnish me with a full report, without, however, being able to give any definite information as to the nature of the affection.

In view of these facts, therefore, one can only depend upon careful observation for a confirmation of the diagnosis of maladie du coit, so far at least as this country is concerned.

The difficulty which we are experiencing in reaching a decision in Alberta is by no means singular, as similar uncertainty has attended the great majority of the outbreaks observed in the United States. It must be remembered that maladie du coit is a disease which is not indigenous to North America, and, like other exotics, may possibly assume an entirely different character from that shown in its natural habitat.

The highest authorities in other countries consider it an incurable disease, and although it was at one time thought that a small percentage of the animals affected might recover under favourable conditions, later experience has shown that such recoveries were more apparent than real and that animals thought to be cured are still, after long periods of seeming health, capable of transmitting the affection to others, either by the act of coition or by artificial inoculation.

In 1899, Surgeon-Major Schneider and M. Buffard, Military Veterinary-Surgeon of Oran, Algeria, conducted a series of exhaustive experiments, and demonstrated the possibility of transmission through inoculation and otherwise, with blood and other fluids taken from both chronic and acute cases, their opinions being endorsed by the late Professor Nocard and other eminent European scientists.

More recently still, in 1902, Veterinary-Major Pease, C.V.D., of the Punjab Veterinary College, has further corroborated the views of the French investigators. The following quotation from Veterinary Captain F. H. L. Baldrey, Veterinary Record, October 10, 1903, affords so clear and concise a synopsis of our present day knowledge regarding the disease, that I feel justified in reproducing it here:—

'The cause of the disease is a trypanosoma similar to the Surra parasite, and it is conveyed from diseased to healthy animals mainly during the act of covering. The symptoms in the horse are very insidious. It commences in a mild manner, attacking only at first the external genital organs; this is soon followed by enlargements and swellings, then by an eruption somewhat similar to nettle rash. Finally it affects the lumbar nervous system, causes nervous degeneration, emaciation, paralysis of the hind limbs, and death. Although the horse is able to cover some time after affection, there is no doubt that he is unable to propagate, even though there be barely any clinical symptoms of his being affected. The disease is, as far as we know, incurable, and moreover, the horse is a source of infection to mares, the latter contingency being an extreme danger, as to any one without professional training, the primary symptoms are almost unnoticeable.

'In mares the diagnosis is even more difficult and the insidious nature of the disease more marked than in the horse. They are nevertheless capable of conveying infection from the first onset of the disease, from which time they also appear to be sterile. This it is that makes the question such a serious one to deal with. The difficulty of localizing or saying definitely how far it exists can only be realized when we take into consideration the number of mares in outlying districts who are seldom seen by any one acquainted with the disease, any if they are, fail to show any symptoms to an ordinary observation.

'Every precaution is, no doubt, being taken, but the incurability of the disease, the fact of its rendering animals sterile in the very early stages, and the impossibility of saying to what extent it definitely exists among the mares of the country render it a decidedly difficult matter to combat.'

The experience of veterinarians dealing with this disease in countries nearer home, has been of an exactly similar nature. It is, I understand, the intention of

Dr. Salmon to publish shortly a bulletin containing a full account of the investigations carried on by the Bureau of Animal Industry during recent years, and I have no doubt that, when this work appears, it will furnish much information of great value to us in Canada.

The disease has undoubtedly been introduced to Alberta by animals from the United States, although careful inquiry has failed to discover the exact channel by which it gained entry. This is not a matter for surprise, in view of the insidious nature of the disease, and the difficulty of detecting its manifestations in its earlier stages or in chronic cases.

As repeatedly stated above, the disease is generally considered incurable by those best qualified to judge, no satisfactory treatment having, as yet, been discovered, although apparent recovery occasionally takes place. This being the case, even in countries where the disease is indigenous, it is possible that under the climatic and dietetic conditions of Alberta, which, in summer at least, are almost perfect, the virulence of the disease may become so modified as to render recovery more frequent than in other less favoured districts. Unless, however, the recovery is complete and permanent, such modification may prove to be anything but a blessing, as it will be certain to render recognition more difficult, and in this way favour the perpetuation of the contagion in unsuspected chronic cases likely to cause periodical outbreaks of a more virulent type.

Copy.

RUSHVILLE, NEB., May 14, 1904.

Chief of Bureau of Animal Industry,
Washington, D.C.

SIR,—In accordance with instructions received, I went to Lethbridge, Alberta, for the purpose of conferring with J. G. Rutherford, Veterinary Director General of the Dominion of Canada, in regard to suspected outbreak of maladie du coit among horses in the vicinity of Lethbridge. I examined such suspects as were available, and have no hesitation in confirming the diagnosis of Dr. Rutherford.

I found no good cases. However, considering in the aggregate the symptoms manifested by different individuals, does not leave room for a reasonable doubt as to the character of the disease. At the ranch of W. T. McCaugherty, eight miles west of Lethbridge, I examined a herd of about fifty mares and one stallion. The stallion presented a general unthrifty appearance, was quite emaciated, eyes and nostrils weeping, scrotum thickened and of a doughy consistency, two plain cicatrices on under surface of penis just below inferior border of prepuce. No plaques showing, but owner gives history that would indicate that they have been frequently in evidence. Meatus highly inflamed, constant dripping of mucus from urethra, voiding of urine frequent and attended with considerable discomfort.

Of the fifty mares, about fifteen are quite suspicious. Several show vaginal discharge and defective muscular co-ordination. Several had small white spots on vulva and cicatrices on vaginal mucous membrane. One mare showed two well defined plaques. In addition to the symptoms which were in evidence, we have the history of a large percentage of abortions. Also the owner gave in detail the history of mare which had died two weeks previous, a case which, I judge from his description, had all the characteristic symptoms of an animal in the advanced stage of maladie du coit.

I examined a stallion at Macleod, the property of one Wm. Damon. This stallion's sheath was badly swollen, and had been so for about six months. This was the only suspicious symptom in evidence, and considered alone, would hardly justify one in regarding stallion as a suspect. However, I learned that this stallion had covered a mare afflicted with a venereal disease of some kind, and that another stallion, which had previously covered the mare died with some kind of a venereal affection.

The history of various suspects and current rumours would seem to indicate that the affection had been prevalent in Alberta for two or three years at least. The origin of the difficulty is at present, of course, only a matter of conjecture.

Very respectfully,

(Sgd.) E. T. DAVISON,
Inspector.

MANGE IN HORSES.

I regret to say that this disease has prevailed during the past year to a greater extent than in any previous season, at least, so far as information can be obtained from the somewhat unsatisfactory records of previous years.

Not only have a considerable number of outbreaks occurred in the Northwest Territories and Manitoba, but the disease has also appeared in widely separate districts in Eastern Canada. Investigation demonstrated that in almost every case the contagion was directly traceable to western horses, and in most cases to animals originating in the western portion of the United States. You will recollect that it was from this source that the infection originally entered Canada some three years ago.

Much valuable work has been performed by our inspectors in the stamping out of this troublesome and highly contagious disease, which in many cases owed its spread to lack of information among owners as to its true nature, and the measures necessary to be adopted in dealing with it.

A large number of animals have been successfully treated, and although the disease still exists in various portions of the Dominion, I am satisfied that we have it well in hand, and that the new regulations, issued during the year, with reference not only to the control of the disease in Canada, but to the more thorough inspection of western horses entering the Dominion, will enable us to entirely stamp it out in the not far distant future.

The large majority of outbreaks occurred in the Northwest Territories.

Directly attributable to western horses, the following outbreaks occured in Eastern Canada:—

Ontario	99
Quebec	34
New Brunswick	17

SHEEP SCAB.

I am pleased to be able to report that very few outbreaks of sheep scab have been reported during the year just past.

In December last, Dr. Frink, export inspector at St. John, reported that he had detected in a lot of sheep presented for export, one individual showing symptoms resembling those of sheep scab. The animal was at once traced to the point of origin, near St. Thomas, Ont., but a searching investigation by one of our regular inspectors failed to discover any evidence of disease in that neighbourhood. It may, therefore, be presumed that the animal detected by Dr. Frink was suffering from some cutaneous affection of a less serious character.

During the same month, an outbreak was reported by Dr. Bradshaw, of Napanee, to which prompt attention was immediately given, with the result that the disease was eventually stamped out by means of segregation and thorough treatment of the infected flock.

During September the appearance of a skin disease among sheep in the neighbourhood of La Baie du Fevre, in the county of Yamaska was reported by the Department of Agriculture at Quebec. An inspector was immediately sent, and as a result

of his investigations, a number of small flocks of sheep, the property of different owners, but which had been grazing together in a common pasture, were placed under quarantine and ordered to be treated.

An outbreak, affecting a small and completely isolated band of sheep, was also dealt with in British Columbia.

ANTHRAX.

Very few outbreaks of anthrax have occurred in the Dominion during the past season, and in every case where the existence of the disease has been reported to the department prompt action has been taken to prevent its spread. In the majority of cases outbreaks were dealt with by our regular salaried inspectors. The work of preventive inoculation is left in the hands of private practitioners, as I do not think it advisable to employ the departmental inspectors in this work.

A list of outbreaks reported is appended:—

Ontario:—Cornwall Co., Dundas (2).

Quebec:—Jacques Cartier, Quebec.

New Brunswick:—St. John.

Eighty doses of anthrax vaccine were sent out from the department.

BLACK-QUARTER.

There has been a remarkable decrease in the number of outbreaks of this peculiar disease, which from its nature can scarcely be dealt with under the provisions of the 'Animal Contagious Diseases Act.' A number of cases have been reported from various districts in Eastern Canada, but it has evidently prevailed to a very slight extent in the Northwest, as is shown by the following statement of the sales of vaccine.

Five hundred and seventy doses were sold by Dr. Hargrave at Medicine Hat, N.W.T., and 438 doses were disposed of by the Royal Northwest Mounted Police.

One thousand one hundred and fifty-five doses were sent out from the department. The total number of doses disposed of during the year was 2,163.

ACTINOMYCOSIS.

This disease is not now dealt with by the department except in so far as the exportation of infected animals is forbidden. It does not appear to prevail to a serious extent anywhere in the Dominion, and very few affected animals have been presented for export.

ACTINOBACILLOSIS.

A number of cases of this disease have been reported to the department and an interesting bulletin on the subject giving the result of the investigations conducted by Dr. Higgins, has been published; see p. 84. This is the first original contribution to the literature of the disease which has appeared on this continent, and has attracted favourable notice from those interested in the subject.

I do not think that actinobacillosis is likely to prove a serious menace to Canadian herds, the climatic conditions being evidently unfavourable to its spread, but the information rendered available by the investigation above referred to cannot but prove valuable.

SWAMP FEVER.

Owing to the lack of suitable cases, the investigation into the nature and causes of the disease known as 'swamp fever,' which for a number of years caused serious loss among horses in Manitoba and the Northwest Territories, has not been productive

of any definite results. It is fortunate that the principal cause of this failure in acquiring information is that mentioned above.

I am of opinion that, as cultivation advances and the low-lying country is drained, the disease will largely disappear.

Be this as it may, it is certainly much less prevalent than it was some years ago.

The report of Dr. Torrance, of Winnipeg, who in conjunction with Dr. Bell, provincial bacteriologist for Manitoba, has this work in hand, may be found on page 112.

EXPORT INSPECTIONS.

The total number of animals inspected during the past year for export to countries other than the United States, is considerably less than for the preceding twelve months. The falling off is explained by the reopening of the New England ports, which were closed from November, 1902, until August, 1903, owing to the existence of foot and mouth disease in several coast states. During the period referred to large numbers of American cattle and sheep were shipped from Canadian ports which, owing to the measures taken by this department to comply in every respect with the wishes of the Home authorities, remained open during the continuance of the outbreak.

The number of animals inspected has, however, been increased to some extent over former averages by the inauguration in February last of the practice of examining all Canadian stock destined for export via American seaports. The neglect of this precaution was always a serious defect in our system of export inspection, as was noted in my last report, and I was much gratified to obtain your approval of my recommendation that the present system should be adopted.

The change has considerably increased the work of our inspectors at Montreal, and has also necessitated the employment during the winter of some of their assistants whose duties formerly ended with the close of navigation.

The safe-guarding of our export cattle trade is, however, of such importance as to completely outweigh the trifling financial consideration involved.

The improved system of reporting inspections adopted last year has been continued, and has proved, from a departmental point of view, a great deal more convenient than that formerly in use. I am about to elaborate it still further by utilizing the reports sent in as the basis of a concise book record which will show the exact state of the trade at any time, and enable us to identify immediately every consignment of stock and to note the inspector's comments regarding it.

To render the system complete, however, it will be necessary to improve on the present methods of marking inspected animals.

I regret that pressure of work has prevented the carrying out of the changes in this detail suggested in my last report. On my way back from the Northwest in April last I met, by appointment, in Chicago, Dr. Baker, senior inspector at the port of Montreal, and with him visited the Union Stock Yards, where, through the courtesy of Dr. Dyson, the officer in charge, we were afforded every opportunity of observing the system followed by the inspectors of the U.S. Bureau of Animal Industry.

I hope to be able, in the near future, to introduce like methods and exactitude in dealing with Canadian export stock.

It gives me great pleasure to report that the duties of all the officers engaged in this important department of the branch have been performed in a most thorough and satisfactory manner.

The following tables show the number of animals inspected for export to all countries other than the United States. With the single exception of cattle for breeding purposes, which are shown under another head, stock exported to the United States is not required to undergo inspection by our officers.

TABLE showing animals inspected at the following Ports:

	Horses.	Cattle.	Sheep.	Swine.
Montreal to Great Britain	294	112,179	49,352	
Inspected at Montreal for shipment to Great Britain via Boston and Portland		30,627	32,254	
Quebec to Great Britain		2,103	875	
St. John, N.B., to Great Britain	31	29,920	22,750	
Halifax to Great Britain	30	6,510	937	
Charlottetown to Great Britain		22	3,378	
Montreal to South Africa	64	189	12	14
St. John, N.B., to South Africa		300		
Charlottetown to West Indies	1			
Halifax to West Indies	26	4	541	9
" Bermuda	105	15	654	32
" Newfoundland		45	165	13
Charlottetown to Newfoundland	58	897	2,057	35
	609	183,111	112,975	103

Total animals exported from above ports—296,798.

Of the above, 38,600 cattle and 17,669 sheep were from the United States.

ANIMALS rejected at the following Ports:

	Cattle.	Horses.	Sheep.
Montreal	233	3	115
St. John	62		17
	295	3	132

Of the above, 35 cattle at Montreal and 2 at St. John were rejected for actinomycosis, one at Montreal for tuberculosis, one at St. John for glossitis, and 68 at Montreal for mange.

Of the horses, two were rejected on account of influenza and the other for strangles.

The rest of the animals rejected were suffering from lameness, or injuries received during transportation, but showing no indication of contagious or infectious disease.

IMPORT INSPECTIONS.

IMPORT Inspections from Europe.

Port.	Cattle.	Horses.	Sheep.	Swine.	Goats.
Levis Quarantine, Quebec	286		370	144	57
Montreal		440			
St. John, N.B.	65	54		3	
Halifax	3	6		3	
Charlottetown					
Total	354	500	370	150	57

IMPORT Inspections from United States.

Port.	Cattle.	Horses.	Sheep.	Swine.	Goats.	Mules.
St. John, N.B.	1			2		
Halifax, N.S.		6				
Charlottetown, P.E.I.		4				
Niagara Falls, Ont.	5	2	105	7		
Point Edward, Ont.	54	229	630	41	7	
Windsor, Ont.	416	18	240	61		
Deloraine, Man.	132	245				5
Killarney.	213	343	1	26		6
Emerson.	404	1,352	14	37		4
Gretna.	1	98				4
Winnipeg	4,300	5,850	177	285		500
Melita.	81	276		8		3
Morden	90	93		3		5
Crystal City and Snowflake.	410	476	6	23		15
North Portal, N.W.T.	10,594	7,493	99	796		586
Maple Creek.	2,645	209	1,737			
Medicine Hat.	104	146				
Wood Mountain	9	907				
Coutts.	3,680	3,642	7,482	33		25
Cardston.	2,278	2,111				5
Pendant d'Oreille.	2,230	354	6,150			7
Lethbridge and Macleod	136	16				
Nelson and Rossland, B.C.	256	404	3,670	71		2
Grand Forks and Midway.	540	712	13,040	64		9
Gateway and Rykerts.	547	993		39		4
Victoria.	98	221	14,046	5		1
Vancouver and New Westminster.	71	425	20,364	1		6
Total.	29,295	26,625	67,761	1,502	7	1,182

IMPORT Inspections from Mexico.

Port.	Cattle.	Horses.
N. Portal	7,360	685

IMPORTATIONS FROM MEXICO.

The number of cattle imported from Mexico during the present season has been much less than that reported last year.

The new regulations issued last spring require intending importers to obtain a permit before bringing stock from Mexico to Canada. This provision, which was made to prevent the importation of stock from States, other than Chihuhua, will, in future, be rigidly enforced, an arrangement having been made with the governor of that State, whereby the introduction thereto of animals from surrounding territory is forbidden. The State of Chihuhua is reported by the United States authorities, and others equally well informed, to be free from Texas fever and other diseases of a contagious nature. Previous regulations, controlling importations from Mexico, continue in force.

QUARANTINE STATIONS.

I am pleased to be able to report a considerable advance in the direction of placing the animals' quarantine stations of the Dominion on a more satisfactory footing than has yet been the case.

At Halifax, after prolonged negotiations, an excellent site has been secured by the purchase of three and a half acres of land adjoining the branch of the Intercolonial Railway known as the Cotton Factory Siding. This property, situated on the outskirts of the city, but within the corporation, can be reached conveniently by rail from the Deep Water Terminus, thus affording a speedy and safe mode of transit for imported animals direct from the ship to the premises where they are to be isolated during the period of quarantine required by the regulations. The necessary buildings, which at this point need not be extensive, have not yet been erected, as it was only recently that the property came into the possession of the department.

At St. John, N.B., where hitherto no proper quarantine station has existed, such animals as landed at that port from time to time having been housed in a small, inconvenient and somewhat unsanitary building leased for the purpose, and to reach which it was necessary to drive them for some distance over the public streets, much better arrangements have now been made. A plot of ground, five and three-quarter acres in extent, has been leased at a nominal rental from the Department of Railways and Canals. This, like the new grounds at Halifax, is situated on a railway siding, so that animals landing at St. John can now be conveyed to the quarantine without being allowed to come in contact with any animal or thing likely to be the means of spreading disease. A few old buildings came into the possession of the department with the lease, and these are being repaired and fitted up for temporary use as quarantine stables. It is expected that they will serve the purpose for some years to come.

At Quebec, some small improvements have been effected in the quarantine station at Point Lévis which in most respects is everything that could be desired from a sanitary point of view. It is, however, as I have stated in previous reports, open to one serious objection, viz.: that as matters now stand, it is necessary to drive or otherwise convey animals for a considerable distance over the public highway before they can be effectually isolated to undergo the required period of quarantine. This is a most serious drawback to the efficiency of the institution, and I would again strongly urge upon you the advisability of arranging for the extension of the Electric Railway to the grounds, so that live stock can be conveyed direct from the steamer.

Sherbrooke and St. Johns, Quebec, have since the date of my last report been selected as quarantine stations for such classes of animals imported from the United States as are subject to detention. So far, however, no arrangements have been made in the direction of securing suitable grounds or buildings, the volume of trade affected being exceedingly small.

At Windsor, Ontario, a convenient site has been leased from the Canadian Pacific Railway Company, and a building, small, but sufficient for the needs of the trade, is about to be erected thereon.

In Manitoba, a new quarantine station has been erected at Emerson on a site which I personally selected last spring on account of its convenience to the lines of the two principal railways entering Canada at that point. This station consists, like others constructed during the past season in the West, and which will be mentioned hereafter, of spacious and substantial corrals, to which are added a squeezer for unbroken animals, a dipping vat, and a small shed for housing hogs in quarantine or cattle which have to be submitted to the tuberculin test. The construction of this new station will enable us to dispense with the use of the old premises at Fort Dufferin, which is inconveniently situated, and the buildings on which have for some time past been falling into serious disrepair.

In the Northwest Territories, stations, similar in character to that last described, have been constructed at Wood Mountain, Pendant d'Oreille, Coutts and Cardston. Arrangements were made last spring with the Commissioner of the Royal Northwest Mounted Police for the immediate construction of the stations above mentioned, as also of a similar one at Roche Percée, and funds for the purpose were placed at his disposal. Owing to various reasons, however, the construction of these stations was seriously delayed, and it was not until late in the fall that those at Wood Mountain,

Pendant d'Oreille and Coutts were available for use. Through difficulties regarding location, the construction of those at Roche Percée and Cardston has not yet been commenced.

In September last, I visited among other places in British Columbia, Gateway, Nelson, Rossland, Grand Forks, Midway, Vancouver and Victoria, and at each place selected a suitable site, and made preliminary arrangements for the construction of quarantine stations similar to those erected in Manitoba and the Northwest Territories.

The necessity for this departure is urgent, as owing to the large importation of live stock from the Northwestern States, in which various contagious diseases of animals are well known to exist, it is imperative that our inspectors should be placed in a position to detain and examine in a thorough and systematic manner all shipments in regard to which they may entertain any suspicion.

The construction of the corrals in British Columbia will be proceeded with as soon as possible in the hope of having them ready when heavy shipments recommence with the recrudescence of immigration in the spring.

CAR INSPECTION.

Much valuable work has been done during the year in securing the cleansing and disinfection of cars conveying animals from infected districts.

The higher officers of the railway companies have shown themselves on every occasion willing to meet the wishes of the department in regard to this matter. The same cannot be said for all their subordinates, upon whom it is, occasionally, very difficult to impress the importance of having suspected cars properly dealt with.

A great improvement has, however, been effected, through close and constant supervision by our inspectors. On several occasions during the year, suspected cars were returned to ordinary traffic in a dirty condition, but in almost every case, by a free use of the telegraph, they were traced and promptly disinfected before being again used for the conveyance of animals.

A distinct advance has been made in securing the cleaning and disinfection of all cars conveying cattle from the mange infected district in the Northwest Territories to outside points, for slaughter or export. There is no doubt that the use of these cars was formerly the means of conveying contagion to stockers' and settlers' cattle going west, creating an erroneous impression in the minds of owners in the range country that mange existed in the eastern provinces.

The officials of the Canadian Pacific Railway Company have co-operated with our officers in this work in a most gratifying manner.

STOCK YARDS.

A steady improvement in the stockyard accommodation of the Dominion has taken place during the past year, although at some points, notably at Montreal and Vancouver, the existing arrangements are anything but satisfactory. The railway authorities, however, have promised that new yards will be constructed at both of these points in the near future.

The Canadian Pacific Railway Company did much valuable work during the past summer in thoroughly cleaning and disinfecting almost all of their yards from Winnipeg west.

They also, at my suggestion, set aside certain yards for the use of animals in transit from the mange infected area for slaughter or export, thus obviating the necessity of subjecting cattle shipped west to the risk of infection, when unloaded for rest or feeding.

It is my intention during the coming year to still further perfect the system of yard inspection, by appointing local officers with supervision over certain districts.

MEAT INSPECTION.

The establishment, on a small scale, of an export trade in meat has led to a demand for inspection certificates such as are supplied by the Bureau of Animal Industry, to persons exporting dead meat from the United States.

There are at present, as far as I am aware, no trained meat inspectors in the Dominion. I need scarcely point out that this lack of skilled experts will prove very awkward if the trade, which has now made a small beginning, develops as we hope and expect it may.

I would suggest that steps be taken immediately to remedy this defect by giving a number of our younger veterinary inspectors an opportunity of acquiring a thorough knowledge of the subject.

I think this might be done by establishing a course of instruction at the Biological Laboratory here, as I am satisfied that if given reasonable assistance, Dr. Higgins would be quite capable of imparting the scientific and technical knowledge required.

MISCELLANEOUS.

In addition to the special meetings called for the purpose of discussing with western stock owners, the question of the eradication of mange, and the annual meeting of the Western Stock Growers' Association, it was my privilege, during the year, to address several other important gatherings. Among these, may be mentioned the public meeting held in connection with the Fat Stock Show at Guelph, and the meeting of the National Live Stock Association which took place in Ottawa last March, at which time I also delivered an address on the breeding of remounts, before a gathering of those attending the Fat Stock Show.

For reasons which will be apparent to those who were present on that occasion, I have thought it advisable to append to this report a copy of the address in question which will be found at page 183.

During the same month, I addressed a meeting of Horse Breeders assembled in Toronto, at the time of the Spring Stallion show, on the subject of Stable Hygiene.

At the request of the management of the Dominion Exhibition which was held at Winnipeg in July, I officiated as judge in a number of light horse classes exhibited there.

In August, I was fortunate enough to be able to attend the annual meeting of the American Veterinary Medical Association which was held in St. Louis. This was a most successful gathering, at which were present many of the leading veterinarians of the United States and Canada. Several subjects of great importance from a veterinary sanitary point of view were discussed, among which may be specially mentioned, glanders, scabies and contagious abortion.

Regarding the two former, much valuable information was elicited, the combined experience of the veterinarians engaged in the work of state control of animal diseases being highly interesting and instructive.

With regard to the last mentioned malady much uncertainty still prevails, even among the highest veterinary authorities. The subject, while a most serious one, is not yet sufficiently understood to render government interference advisable or likely to be productive of satisfactory results.

A great deal of attention is, however, being devoted to the question, and it is to be hoped that before long it will be possible to formulate a definite and intelligent policy, having for its object, the control and eradication of this costly scourge.

It has also fallen to my lot during the year to take some share in the movement now in progress among Canadian veterinarians towards an improvement of the standard of professional education. This branch of learning, although of the most vital importance to the live stock interests of the Dominion, has so far received little encouragement or support from any public source. It is to be hoped that the indif-

ference heretofore displayed will ere long be replaced by an intelligent recognition of the necessity for according to Canadian veterinary education a status properly befitting its national importance.

I have the honour to be, sir,
Your obedient servant,

J. G. RUTHERFORD,
Veterinary Director General.

The Honourable
The Minister of Agriculture,
Ottawa.

REPORT OF THE PATHOLOGIST.

(CHAS. H. HIGGINS, B.S., D.V.S.)

OTTAWA, October 31, 1904.

SIR,—I have the honour to transmit this, my sixth annual report as an officer of the Department of Agriculture, my third as its Pathologist, covering my work from November 1, 1903, to October 31, 1904.

The Biological Laboratory has become a greater necessity, and we have successfully and economically undertaken the preparation of a biological product. Still greater advances can be made in the manufacture of these products, and it is our aim and intention to undertake the work just as soon as facilities and assistance will allow without interfering with the present routine of the laboratory. The statement of last year, that the most serious drawback to our work was lack of assistance, still holds true, and the positive assurance has been given that this defect will soon be remedied. The remedying of this defect will allow the taking up of new investigations on original lines which cannot fail to be of immense importance to the agricultural resources of this country. As we are at present situated, the consideration of original research, save in few exceptions, is impossible, the routine of the laboratory being such that the necessary time is not available for the careful and painstaking study of the problems confronting us.

Another need, which will soon be a necessity if our efforts are to yield practical results, is a suitable stable for experimenting on the animals susceptible to the disease or diseases which we may be studying, and it is essential that we have a building constructed in such a manner as to render it practically if not absolutely germproof, which precaution will render counter infections impossible. The absolute exclusion of counter infections can only be expected in a building constructed of impervious material. The need of such stabling accommodation was mentioned in the report of the Veterinary Director General of last year, and I will not further dilate upon the necessity of this feature in the practical results to be obtained from our investigations.

Our acetylene gas plant is still giving satisfactory service, although its capacity is taxed to the utmost and it will ere long be necessary to increase the installation to meet the constantly growing demands of this institution. The experimental stage in the use of acetylene gas for bacteriological and other laboratories has passed, and for our particular work there is no other gas which will meet the requirements as economically in isolated localities. There is absolutely no danger in such an installation provided there is exercised a similar amount of care as would be bestowed where ordinary coal gas is employed; indeed, the safety and ease with which this gas can be manipulated, together with the absence of a gas-like odor when burning (noted where

either coal or gasoline gas is used, due to the liberation of unconsumed hydrocarbons), are considerations of moment.

The further detailing of our needs as an institution is not pertinent to this report, for our growth has been healthy and will of necessity require further additions to our equipment proportionate with the work which we undertake.

During the past year there have been ninety-three series of specimens received for diagnosis and save in those instances where the diagnoses have indicated an economic importance, they will not be mentioned in this report. This material represents a smaller number of series than was received during the year preceding. The specimens were, however, of greater importance and representative of a greater variety of pathological conditions. This decrease in number was almost wholly due to the lessened prevalence of hog-cholera, the number of specimens received from suspected cases of this infection being but about half that of the preceding year.

The details of interest connected with our work and other remarks will be found under the various headings which follow.

CATTLE DIP.

The order relative to the dipping of range cattle for the eradication of mange, created the necessity of a means by which the strength of the dip could be determined. On the request of the Veterinary Director General, this work was undertaken. The initial step in this connection was the precipitation of the sulphur with a saturated aqueous solution of oxalic acid, but this method from the outset seemed too cumbersome for the needs of the inspector in the field, principally on account of the time consumed, it being necessary to wait at least half an hour for the precipitate to settle before an accurate reading could be made. Knowing that the density of chemical solutions bears a direct relationship to the amount of any given chemical or chemicals contained therein, the hydrometer test was used on several samples of dips, and it was found that when dips were prepared according to a definite formula and a given technique, the hydrometer readings would correspond. To more accurately arrive at definite results, several samples of dips, each of which had given a certain hydrometer reading, were sent to the chemical laboratories of the Experimental Farm with a request that the amount of sulphur contained in each be determined. The results of the chemical examinations went to show that there was a distinct relationship between the hydrometer reading and the percentage of sulphur in solution. The reading of the Canada Official Dip* with the hydrometer was 1023·5 and the chemical analysis revealed the presence of 1·61 per cent of sulphur in solution. The instrument which seems to be the most practical for this hydrometer test is the ordinary urinometer used by physicians, and the form having the thermometer blown in the instrument is to be preferred as the allowance for the correction necessary when the temperature of the liquid is above 60 degrees Fahrenheit, is automatically made, it only being necessary to add this correction to the reading on the stem of the instrument in the accurate determining of the strength of the dip. There is another point to be noted, namely, that in urinometers, water is reckoned as 0, while in the hydrometer it is considered as 1000. Thus a solution giving an hydrometer reading of 1023·5 would give a reading of 23·5 when using a urinometer.

Dip exposed to the action of atmospheric air rapidly decomposes and should for this reason be tested immediately before use. A thin coating of oil on its surface will prevent this decomposition should it for any reason be necessary to allow the dip to stand after preparation, for any length of time.

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* The Canada official dip consists of:—10 pounds fresh lime, twenty-four pounds of sulphur and 100 gallons (Imp. Br. measure) of water. In my experiments this mixture was boiled two hours.

Further experiments in the preparation of the lime and sulphur dips have been conducted along the lines mentioned by Dr. A. T. Peters, of the Nebraska Experiment Station. At the meeting of the American Veterinary Medical Association in August last he made the statement that by the addition of glycerine in the proper amount to the freshly fused lime and sulphur, the mass could easily be brought into solution at any subsequent time. In my experiments I have mixed all of the ingredients, including the glycerine and then boiled the same for a period of two hours. After the mixture had been boiled the requisite time it was made into cakes, the surfaces being coated with parafine. These cakes are easily dissolved at any subsequent time and the fluid after decanting will give the same hydrometer reading as that obtained by dissolving a cake in a similar amount of water immediately after its preparation. The preparation of the dip in this manner may have some advantages, in that it can be prepared where facilities are available and the cakes taken to the dipping vats where they can be dissolved, the only fire necessary being that required to bring the dip to the proper temperature as mentioned in Bulletin No. 10, page 7, on 'Mange,' prepared by the Veterinary Director General.

The formula used in the preparation of this 'tablet form' dip was:—

Fresh lime, 10 pounds.
Sulphur, 24 pounds.
Water, 10 quarts.
Glycerine, 5 quarts.

This must be boiled vigorously for two hours, during which time the evaporation will have been sufficient to make the mass of the proper consistency and may then be poured into a tin or other container for transportation. If it is necessary to allow this to stand for some time after preparation the surface should be coated with parafine to prevent decomposition on the surface. Prepared as above it can be diluted with one hundred gallons of water to make a dip of the proper strength.

ANTHRAX.

The services of the laboratory have been called upon repeatedly during the past year for opinions as to whether or not sudden deaths in certain cases were due to the Bacillus Anthracis. In only one instance has this infective agent been found. In this connection I desire to point out the necessity for more careful observation when animals are suspected of dying from anthrax. The possible causes of death other than anthrax infection should receive careful consideration, as it is much more difficult to make a diagnosis after a report of negative microscopical findings.

TUBERCULOSIS.

The services of the laboratory have been repeatedly called upon for the microscopical examination of tissues suspected to contain evidences of tuberculosis. The most important material of this nature consisted of some fowls sent in, that we might determine the cause of their unthriftiness. Tuberculosis was identified in two instances. A more detailed statement concerning this affection in poultry will be made in connection with poultry diseases.

The need for further investigations on tuberculosis in Canada are as pressing as ever, new lines have been suggested by various workers and we can with profit undertake original researeh.

TUBERCULIN.

During the past year there have been 2,649 doses of tuberculin sent from the laboratory to inspectors and others on the order of the Veterinary Director General, against 2,391 doses for the year preceding. Small quantities have been prepared ex-

perimentally and cultures have been kept growing with a view to the ultimate production of sufficient to meet the needs of the department. I append hereto a statement indicating the amounts sent out each month.

	1903-1904.
November	326
December	326
January	350
February	303
March	295
April	146
May	272
June	119
July	123
August	173
September	70
October	146
Total	2,649

GLANDERS—MALLEIN.

The most important work in connection with glanders relates to the production of mallein. There have been sent from the laboratory 3,153 doses on order of the Veterinary Director General against 1,353 doses of the preceding year. We have with the exception of 316 doses required when starting on this work, manufactured the whole of the supply needed to meet the demands of the department. The amount sent out does not include the entire production as it is our aim to supply a product that is fresh and potent, which has necessitated the throwing away of some of our manufactured product which may have been potent but which we did not wish to have used on account of its age. The average cost for the year has been eleven cents per dose as shipped from the laboratory. This estimate includes labour, gas and material with an allowance for the breakage of glassware, &c. The mallein previously supplied has cost twenty-two and one half cents per dose, with an additional expense for bottles, corks, labels and labour necessary in preparing it for use.

A monthly statement of the doses dispensed for the past year is as follows :—

November	291
December	40
January	135
February	155
March	203
April	184
May	412
June	422
July	75
August	560
September	305
October	371
Total	3,153

PICTOU CATTLE DISEASE.

Specimens have been received during the past year from eight suspected cases of Pictou cattle disease. These specimens were obtained, in four instances, from ex-

perimental animals (Nos. 16, 17, 8 and 11, laboratory numbers 271, 272, 285 and 286 respectively), of the Antigonish experimental station. For a statement as to the manner of feeding, care and clinical history of these four cases refer to the report of Dr. W. H. Pethick, Inspector in charge of the station.

The lesion associated with the disease, as pointed out by Osler, Wyatt, Johnson and Adami, is the cirrhotic condition of the liver. The deposit of fibrous tissue is noted chiefly about the smaller bile ducts (plate XIII) and there is atrophy of the liver cells. From this invasion of fibrous connective tissue about the bile ducts (periportal), we note also its deposit between the individual cells (peri-cellular). The lymph glands of the mesentery are somewhat swollen and contain bacteria, but present no marked lession. These bacteria, which are also found in the liver, were first thought by Adami* to hear a direct relationship to the affection, but have since been identified as a form of the Bacillus coli.* I have found these bacteria in the tissues and have also studied them in cultures. It is my opinion that they bear no relation to the cause of the affection, but gain access to the tissues through the lowered vitality and resistance of the cells.

The livers of the experimental cases have in every instance, presented lesions not distinguishable from the lesions above mentioned, which have in turn been studied by Osler, Wyatt Johnson, Adami and myself. Dr. Pethick has mentioned in a personal letter the presence of the stomach ulcers in these experimental cases. We cannot then, conclude otherwise, than that these experimental cases are true cases of Pictou cattle disease.

I present herewith three micro-photographs (plates XII, XIII, XIV) showing the lesions found in the liver of animals suffering from various stages of this affection. It will be noted that plate XIV is a micro-photograph of a section of the liver from experimental case No. 11 (laboratory number 286).

HOG CHOLERA.

Specimens of suspected hog cholera have been received from time to time with the request that an opinion be given as to the presence or absence of lesions. From the records of these cases the fact is noted that there have been fewer specimens sent in than in preceding years and I believe this is due to the thorough and effective manner of dealing with this affection during the past two years. Original investigations with this disease have not been pursued during the past year. A photograph of the lesions in a hog returning from St. Louis is found on plate XI. .

VERMINOUS BRONCHITIS IN HOGS.

The prevalence of verminous bronchitis in hogs was mentioned in my report of 1902, and a great many lungs, infested with Strongylus paradoxus, the nematode worm causing this affection have been received during the year just ended. This affection seems little understood and is frequently mistaken for other conditions, when a careful search would reveail its positive agent. A microscopic examination is not required in its diagnosis. The nematode worm, Strongylus paradoxus, is described by Neumann as follows :—

'Mouth encircled by six lips, the two lateral being the largest. Male, 16 mm. to 25 mm., long; caudal pouch deeply bilobate, each lobe being sustained by five ribs. Spiculæ slender and very long. Female, 20 mm. to 40 mm., long with curved mucronated tail; vulva situated on a pre-anal eminence. Oviparous and ovoviviparous. Habitat, the bronchii of the pig and wild boar and also sheep according to Koch.'

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* Annual report of the Minister of Agriculture, 1894. Page 89.
* Annual report of the Minister of Agriculture, 1901. Page 132.

In an animal but slightly infested with these worms their presence might easily pass unnoticed, but an increase in numbers renders the symptoms more prominent. We may note evidences of bronchial catarrh with difficult and painful respiration. A loose cough may be observed when the animal is required to move. Recovery may take place spontaneously where the animal is vigorous and the parasites are few.

The treatment of this affection consists mainly in its prevention, from the fact that it is very difficult to use medicinal agents which will affect the parasites without endangering the life of the host. The animals should be allowed plenty of good clean bedding in a dry well-ventilated place. They should be removed to quarters not contaminated by the eggs which may be discharged with mucus from an infested animal. Once a certain piece of land is infected the hogs should be removed and the ground cultivated.

The diagnosis is very easy and the photographs (plates IX and X) will be of some assistance. The surface of the lung has a mottled appearance similar to that seen in broncho-pneumonia. In slitting open the bronchii worms are found and can easily be seen without the aid of a magnifying glass.

Where there is but a slight infestation, some searching may be required and the smaller bronchioles followed, when, if the worms are present they will be found curled up and surrounded by mucus, the secretion of which has been stimulated by their presence.

DISINFECTANTS.

A sample of disinfecting material was received at the laboratory and a report as to its efficiency forwarded to the department. The material in question being like a large portion of the disinfecting agents, of proprietary origin, as also were a number of those with which it was compared, and as it is impossible to publish results which will hold for all the material sold under any given trade name, there being, unfortunately, some unscrupulous manufacturers of these products, I do not deem it wise to incorporate these data in this report. The technique followed in determining the efficiency is essentially that of Sternberg with modifications to meet our requirements.

POULTRY DISEASES.

Poultry diseases in Canada have received very little attention with the exception of the admirable work carried on at the Guelph Agricultural College under the direction of Prof. Harrison. The subject is an intensely interesting one, and withal important, that the exact cause of any unthriftiness in a flock may be determined and intelligently dealt with. Since my first research on a disease at St. Anne de Bellevue, Que., in 1895, which proved to be very similar if not identical to the true European fowl cholera (which I may say is the only recorded instance of a disease so closely simulating that affection on this continent) every opportunity to study poultry diseases has been taken advantage of and much information has been gained with an important bearing on the diseases of other species of animals. I have during the past year examined many fowls sent to the laboratory and believe that much assistance has been rendered from the actual diagnosis of the condition present in the infected birds. Intestinal parasites have been common and will continue to be so till such time as those who aim to gain profit from the rearing of poultry learn that fowls must be kept under proper hygenic conditions if intestinal parasitic infestations and other diseases are to be avoided. The parasites most commonly found were round worms and tape worms. Of the round worms two varieties only have been identified, *Heterakis differens* and *Heterakis inflexa*. The former has been found in all save four birds examined, while the latter has been found in three instances only. The former does not necessarily exert any marked deleterious influence save when found in great

numbers. The latter when few are present may cause great emaciation and even death. Tape worms have been found quite frequently. Any of the worms are easily detected when present, by slitting the intestine open with a pair of scissors and gently washing in luke warm water. When parasites are found an effort should be made toward eradication as the droppings are infected. Individual birds may be treated with santonin if their value is sufficient to warrant such a proceedure.

Our most important work on poultry disorders was the identification of tuberculosis in two instances. In a fowl received from Enderby, British Columbia, and in one originting near Renfrew. In both cases the disease was well advanced, being generalized throughout the organs of the abdominal cavity. The tubercular enteritis with the nodules present in the liver and spleen are well shown on Plate VIII. There can be no doubt that a fowl infected to such a marked degree must have been a constant menace to all others with which it may have come in contact, as countless numbers of bacilli were present in the faeces. This is, I believe, the first identification of poultry tuberculosis in Canada. It has been identified by a worker at the Oregon Experiment Station* and by Moore and Ward † in California. Many suspected outbreaks have been reported, but with the exception of those indicated above, lack positive identification.

Those interested in poultry-raising should take great pains to determine the exact cause of any unthriftiness in their fowls, and if it is found that tuberculosis is present every means should be adopted for its eradication, otherwise the value of the flock will be greatly depreciated. Tuberculin has been shown by Ward‡ to be valueless in fowl tuberculosis. He has used with other tuberculins that prepared from Avian tubercle bacilli. If tuberculin were of value in diagnosing fowl tuberculosis, its use would be restricted to valuable birds and to experimental work, as its application would entail too great an expense for a testing out of infected birds in even a small flock. In its eradication one can not be too careful of their disinfecting measures. Its introduction into uninfected poultry yards should be guarded against by a careful consideration of the origin and history of any fowls which may be introduced and as an additional safeguard new fowls should be kept isolated and under observation for some little time before being allowed to run with other fowls. As a precautionary measure, good sanitary surroundings with plenty of sunlight, fresh air, clean water and good food will do much toward its prevention.

ACTINOBACILLOSIS.

The most important work of the year has been the preparation of a bulletin* on this disease, which has for the first time been described on the North American continent. Since its preparation, however, some additional data has been obtained, a brief résumé of which will be of interest.

In one case, a guinea-pig inoculated subcutaneously in the flank region, the characteristic lesions were present at the angle of the jaw. These lesions consisted of the fluctuating tumor masses with abscess formation, in the pus of which the peculiar granules were observed on microscopic examination. The external lymphatics were enlarged, but there were no microscopic internal lesions.

An outbreak has been observed in which many animals were affected simultaneously, and the only introduction into the herd was a steer which had changed hands a number of times on account of his general unthriftiness and the presence of a discharging abscess at the angle of the jaw. On seeing the animals, I made the provisional diagnosis, that the affection was due to the bacillus of Actinobacillosis, and

* Proc. Am. Vet. Med. Ass., 1903, page 185.

† Avian Tuberculosis. V. A. Moore and A. R. Moore, Proc. Am. Vet. Med. Ass., 1903. Page 169.

‡ Ward. Proc. Am. Vet. Med. Assn., 1904. Rpt. Comm. on Diseases.

* Bulletin No. 1. Biological laboratory series. See page. .

this diagnosis was confirmed by an autopsy on a three-year-old heifer badly affected in the region of the throat and tongue. The history of the steer in question indicated that a number of animals in every herd with which he had associated had been affected similarly, but that they had recovered when treated with either the empirical lump-jaw remedies, or by potassium iodide in the hands of a veterinarian. The disease in the outbreak referred to was of a mild type and it was with difficulty that animals could be experimentally infected with the cultures obtained therefrom.

I believe that the climatic conditions peculiar to Canada are responsible for our not having more acute cases of this affection and for its easy control when it does occur.

In concluding my report, I desire to express my appreciation of the efforts of the Veterinary Director General, Dr. J. G. Rutherford, who has ever been ready and willing to offer timely advice and encouragement in the conduct of the laboratory work.

I have the honour to be, sir,

Your obedient servant,

CHAS. H. HIGGINS, B.S., D.V.S.,

Pathologist.

The Honourable

The Minister of Agriculture,

Ottawa.

(A. E. MOORE, D.V.S.)

OTTAWA, October 31, 1904.

SIR,—I have the honour to submit to you this, my annual report for the year ended October 31, 1904.

GLANDERS.

This year I have made 229 tests with mallein. The horses were all in small lots, in about seventy different places.

Horses tested for the		first time	114
"	"	second time	56
"	"	third time	28
"	"	fourth time	25
"	"	fifth time	3
"	"	after being ceased reactors for one year	3

The total number destroyed was forty; seven of which were destroyed on clinical symptoms alone, and thirty-three after being tested. Of the thirty-three, twenty-six showed clinical symptoms of glanders; the remaining seven, which were free from clinical symptoms of the disease, were destroyed after the Order in Council of the 19th of September was passed. For these animals the owners received compensation.

I have examined a large number of horses clinically, especially in Ottawa, Hull and the surrounding country. In many of these cases the suspicious symptoms were due to distemper and in a few to diseased teeth.

MANGE IN HORSES.

In April, I discovered several horses in the city of Hull which were affected with Sarcoptic mange. While dealing with these cases, I was informed that there were

horses affected with the same disease at Caledonia Springs. I proceeded to Caledonia Springs where I found the disease on eight different farms, twelve horses being affected. In tracing the origin of certain diseased horses, I was obliged to go to Vankleek Hill. While there I visited Drs. Metcalfe and Irvine, who informed me that the disease was extremely prevalent in their district and that they had been treating it for some time. I obtained from them the names of all the people who owned horses that were actually affected, or whose premises had ever been infected. I then employed a most reliable guide and through his thorough knowledge of the people and the country was able to visit 60 farms where the disease actually existed, affecting eighty-nine horses. I visited a great many other farms where horses had been successfully treated, and ordered the disinfection of the stables, where it had not already been properly done. Where mange was found, I inspected the horses on all adjacent farms and in this way saw a great many horses in this vicinity. I found the disease usually in small centres from two or three farms to six or eight farms, often carried to these centres by horse traders.

As Vankleek Hill seemed to be the centre of the infected district, and diseased horses were coming to that place every day, I deemed it advisable to order the disinfection of all the public stables, tying sheds, blacksmith shops, and tying posts.

Many cases demanded persistent treatment and the people, with few exceptions, did everything in their power to assist me in stamping out this troublesome malady. The result of our work has been highly satisfactory, all cases that have been dealt with were cured, and disinfection promptly done.

Dr. Geo. Higginson co-operated with me and finally took entire charge of this outbreak.

During the year I quarantined and ordered ninety-five mangy horses tested. Eighty-nine being in the province of Ontario and six in the province of Quebec. Sixty private stables and thirty public places were ordered disinfected.

Six horses died, and several, being worthless were killed by the owners instructions.

Symbiotic scabies affected a large number of horses in one firm in the city of Ottawa ; they have been successfully treated.

TUBERCULOSIS.

I have tested sixty-seven head of cattle with tuberculin ; twenty being pure-bred cattle for export to the United States. Ten were diseased. Forty-seven were high grade cows which were for shipment to South Africa. One was diseased.

I ear-marked twenty-one reacting cattle which were tested at the owners' expense.

HOG CHOLERA.

I have dealt with only three outbreaks of this disease during the year. They were confined to three farms and only a few hogs were infected. No newly-infected districts came to my notice.

I visited one farm, where I found hogs to be suffering from verminous bronchitis.

SHEEP SCAB.

I have investigated one outbreak of sheep scab this year. The owner succeeded in stamping the disease out after considerable trouble. When I first visited this farm only one ram was very slightly affected. I quarantined all the sheep on the premises, however, and ordered the ram to be dipped. Later quite a number of the ewes became infected. The owner persisted in his treatment and finally cured them all. This might have been a very serious outbreak, as the owner is a large breeder of sheep, and makes

many sales during the year. This ram came from the Toronto exhibition and was found to be infected shortly after his arrival.

TYPHOID INFLUENZA.

In July it was reported to this department that many horses were dying at Garden River, Ont. Acting on instructions, I visited that place on July 30, and found about twenty horses belonging to one firm affected with typhoid influenza. I held a post-mortem on two cases and found the characteristic lesions.

Dr. McCann, of Mattawa, had charge of the cases, and was very successful in his treatment.

There were several other outbreaks of this disease in the neighbourhood of Sudbury, which were being treated by Dr. Taylor.

I have the honour to be, sir,
Your obedient servant,

A. E. MOORE,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(M. C. BAKER, D.V.S.)

MONTREAL, October 31, 1904.

SIR,—I beg to submit my annual report for the year ending October 31.

During the year I inspected and passed for shipment at the Canadian Pacific Railway stock yards, Hochelaga, 71,388 head of cattle and 31,732 sheep; only 14 swine were shipped, these being shipped to South Africa. There were 84,583 cattle and 29,079 sheep shipped last year when the shipments of cattle were exceptionally large owing to the embargo in Britain against cattle shipped from United States ports.

The inspection is distributed monthly, as follows :—

Months.	Ranche Cattle.	Domestic.	United States Cattle.	Canadian Sheep.	United States Sheep.
1903.					
November		8,243	1,350	6,740	
1904.					
November to May		18	300		
May		6,615	1,857	569	
June		7,442	1,212	3,150	
July	2,791	5,802	561	2,999	
August	9,673	4,753	234	3,446	
September	6,955	3,500	1,038	5,540	1,334
October	6,724	2,186	134	7,293	661
Total	26,143	38,559	6,686	29,737	1,995

Grand total for cattle 71,388
Grand total for sheep 31,732

During the year there were rejected as unfit for shipment one hundred and fourteen head of cattle, sixty-five sheep, mainly on account of lameness or injuries received in transit. The only diseases of a contagious nature, four cases of actinomycosis

and thirty-seven cases that were suspicious of mange. Whilst I was not positive that these animals were actually affected with mange, I considered them suspicious and therefore ordered all such cases sent to the slaughter house.

In February last I received instructions from the Veterinary Director General to inspect all Canadian cattle and sheep passing through Montreal for export via Boston and Portland, 4,302 head of cattle, 994 sheep (these are included in the numbers given above), 2,103 head of cattle, 875 sheep also included above, were loaded at Quebec and Three Rivers.

I had hoped to report that the old stockyards would have been entirely reorganized or new ones built in the early part of the present season. But the railway authorities claim that owing to the amount of construction over the line they were not able to get the stockyards; but I am assured by Mr. Oborne the General Superintendent, that the plans for new yards are well under way and that new yards will be positively ready for the opening of navigation next spring and that it is the intention to have these yards covered and floored. A portion of the present yards have been in such a state owing to the mud, that I could not allow cattle in them during the latter part of the season, allowing only the floored and covered portions to be used.

I was sent for in September to see a sick heifer at Como, found the animal dying from symptomatic anthrax (black quarter). I ordered the carcass to be burned, and the field fenced off, to prevent other cattle getting in to it. This was done and no further cases have occurred.

I have the honour to be, sir,

Your obedient servant,

M. C. BAKER,

Inspector.

The Honourable

The Minister of Agriculture,

Ottawa.

(CHAS. MCEACHRAN, D.V.S.)

MONTREAL, October 31, 1904.

SIR,—I beg to report during the year commencing November 1, 1903, and ending October 31, 1904, there were inspected, found free from disease and shipped from the port of Montreal to Great Britain, 294 head of horses. Three horses were held back, viz.: One suffering from strangles and two from influenza.

There were imported to Canada during the year via port of Montreal, 440 head of horses, viz., 266 stallions, 169 mares, 3 geldings and 2 colts.

All were inspected and allowed to go forward to their destinations.

The exportations and importations have been as follows :—

Months.	Exportation.	Rejected.	Importation.
1903.			
November	32		48
1904.			
May	65	3	19
June	67		87
July	19		2
August	27		73
September	45		52
October	39		159
Total	294	3	440

IMPORTATION.

	Stallions.	Mares.	Geldings.	Colts.	Total.
Clydesdales	197	104		2	
Shires	15	2			
English Thoroughbred	2				
Suffolk Punch	2				
Boulanaise	4				
Percheron	13	1			
Hackney	16	3			
Ponies	8	59	3		
Jackasses	9				
	266	169	3	2	440

I have the honour to be, sir,

Your obedient servant,

CHARLES McEACHRAN,

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(B. A. SUGDEN, D.V.S.)

MONTREAL, October 31, 1904.

SIR,—I have the honour to report to you upon the inspections of live stock made at the Grand Trunk Stock Yards, Montreal, during the period extending from November 1, 1903, to October 31, 1904.

The monthly shipments have been as follows :—

Month.	Canadian Cattle.	U.S. Cattle.	Canadian Sheep.	U.S. Sheep.
1903.				
November	3,731	126	5,866	
1904.				
May	3,557	2,439	18	
June	6,271	2,036	859	
July	7,832	732	3,704	
August	7,639	189	1,518	
September	5,346	2,210	2,772	659
October	4,036	1,541	4,105	
	38,412	9,273	18,842	659
	9,273		659	
Total Cattle and Sheep	47,685		19,501	

In February, 1904, the inspection of Canadian cattle and sheep passing through Montreal for shipment at the port of Boston and Portland was commenced. Since that date the monthly shipments have been as follows :—

Month.	Boston.		Portland.	
	Cattle.	Sheep.	Cattle.	Sheep.
February	.....	.....	1,152	124
March	75	.....	1,279	252
April	556	.....	1,205	.....
May	529	.....	1,442	132
June	1,136	.....	2,566	3,746
July	1,370	561	2,771	3,769
August	1,656	301	2,657	2,404
September	1,298	.....	1,775	1,717
October	1,558	971	1,011	.....
Total	8,178	1,833	15,858	12,144

During the past year one hundred and nineteen cattle were rejected, thirty-one affected with actinomycosis, one tuberculosis, two blind, thirty-one mangy. The balance for sore feet or injuries received during transportation. There were fifty sheep rejected for sore feet and various injuries received during transportation.

From November, 1903, to October 31, 1904, the following United States cattle and sheep passed through Montreal for shipment at Portland and Boston :—

	Cattle.	Sheep.
Portland	18,446	29,411
Boston	7,879	1,849
	26,325	31,260

I have the honour to be, sir,

Your obedient servant,

B. A. SUGDEN,

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(J. H. FRINK, V.S.)

ST. JOHN, N.B., October 31, 1904.

SIR,—I beg to submit my annual report concerning inspection of animals at this port and district.

Animals Inspected for Export.—Great Britain and South Africa : Cattle inspected, 31,072; sheep inspected, 22,750; horses, 31. Three shipments of cattle, after inspection here, were sent forward to Halifax for loading. The total number of cattle being 30,220 placed on shipboard here. All these, with the exception of one shipment by ss. 'Oriana,' went to Great Britain. Two cattle were condemned with actinomycosis, one with acute glossitis, fifty-nine cattle were condemned for lameness and injuries in

transit; two died in the yards from intestinal disorders, and fifteen sheep were also condemned for injuries; two sheep were condemned, suspicious of scab.

The Canadian Pacific stockyards were not maintained as well as they should have been after the month of February, and it became necessary for me to officially notify the railway that these must be kept in a clean and comfortable condition. This work was not done as promptly as I would have liked, and was only completed by continued urging.

Inspection of Animals—Mange : In February, information reached me, that mange on horses, existed in a public stable within the city limits, and from this source it was being distributed about the country. Examination of the subjects and inquiry into the history, left no doubt as to the diagnosis and character of the disease. Microscopic investigation by the bacteriologist at Ottawa, confirming this. This place was at once quarantined, and the horses which had escaped before my entrance were followed and quarantined, and kept under surveillance until discharged. Some animals were so badly affected that they were destroyed by the owners. The work of eradication was facilitated by the majority of the owners submitting cheerfully to quarantine restrictions. A few people endeavoured to frustrate the work of the department, but when it was made perfectly clear to them that violators would be summarily dealt with according to law, resistance ceased. Eighteen horses were found affected during the year, and nearly all were directly traced to a single centre of infection. The usual remedies were resorted to with sulphur as a base. A very efficacious remedy was found in bi-chloride of mercury soap. There does not appear at this time of writing to have been any further outbreaks in the province. The disease in question, I think, originated here from range horses brought in from the western states by the Imperial government for shipment to South Africa, but at the close of the war were sold to various parties.

Anthrax.—Information having been furnished me that several cattle had died suddenly on the farm of Joseph Stackhouse, Upper Loch Lomond, St. John county, and that contagious disease was suspected, an inspection and post-mortem examination was made, the bacillus of anthrax was easily identified on microscopical examination; five cattle died, the carcasses were burned and the stables cleansed and thoroughly disinfected.

Tuberculosis.—A number of cattle were subjected to the tuberculin test, belonging to Governor Snowball. These animals were found free.

Fifteen head of cattle imported from Scotland by ss. 'Lakonia' were subjected to the tuberculin test in quarantine. Six animals reacted, and one suspicious. These six were permanently ear-marked and one branded on the hoof.

TRANSPORTATION OF ANIMALS FROM GREAT BRITAIN AND HOLLAND.

1903.—Dec. 17.—Three head Berkshire swine imported by Wm. Linton, Aurora, Ont., from Scotland.

1904—February 17.—Fifty head Holstein cattle from Antwerp, ex ss. 'Montrose,' 46 cows and 4 bulls. Eighteen calves were born in quarantine. At the expiration of ninety days these were discharged, having been subjected to the tuberculin test by the United States veterinary officer in Holland. These animals were consigned to Messrs. Ward, Mitchell, Knowles, Syracuse, N.Y. State.

March 23.—Fifteen cattle, twelve shorthorn, three polled Angus, were imported from Scotland, by Graham, Carberry, Man. These were detained, ninety and fifteen days, respectively, in quarantine and discharged.

December 7.—Seven horses imported, ex ss. 'Lakonia,' Glasgow, by D. Campbell, Alverston, Ont., and J. Graham, Carberry, Man.

February 2.—Sixteen horses imported, ex ss. 'Tritonia,' Glasgow, by Thomas Graham, Claremont, Ont.

March 23.—Twenty-one horses imported by J. Graham, Carberry, Man., ex ss. 'Lakonia,' Glasgow.

April 9.—Ten horses imported by Quebec government, ex ss. 'Montezuma,' from Rotterdam—Belgian breed.

The animals were inspected and found free from contagious and infectious disease and were allowed to proceed.

INSPECTED FROM UNITED STATES.

1903.—Two head swine, imported by R. K. Britton, Woodstock, N.B., quarantined fifteen days and discharged.

1904.—May 18.—One Guernsey bull, imported by Walter McMonagle, Sussex, N.B., from United States. being accompanied by necessary health certificates, was allowed to proceed.

I have the honour to be, sir,

Your obedient servant,

JAMES H. FRINK,

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(Wm. Jakeman, D.V.S.)

Halifax, N.S., October 31, 1904.

Sir,—I beg leave to submit my annual report of animals inspected at port of Halifax, N.S., for one year ended October 31, 1904.

Animals inspected for export at Halifax, N.S., 1903-04.

	Horses.	Cattle.	Sheep.	Swine.
1903.				
November	28	351	103	
December	4	1	84	
1904.				
January	21	1,779	596	4
February	2	1,154	604	
March	15	1,134	143	
April	2	603	142	15
May	1	784	151	3
June	1		10	
July	1		90	1
August	8	5	20	24
September	9	4	113	3
October	72	7	160	4
	164	5,822	2,216	54

ANIMALS inspected for Import at Halifax, N.S., 1903-04.

	Horses.	Cattle.	Sheep.	Swine.
1903.				
November	4			
December	1			
1904.				
January	1			
March	1			
April	1	3		3
May	2			
September	1			
October	1			
	12	3		3

I have the honour to be, sir,
Your obedient servant,
WM. JAKEMAN,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(A. A. LECKIE, M.R.C.V.S.)

CHARLOTTETOWN, P.E.I., October 31, 1904

SIR,—I have the honour to submit my annual report of animals inspected at the port of Charlottetown, P.E.I., for the year ended October 31, 1904.

ANIMALS inspected for Export at Charlottetown, P.E.I.

	Horses.	Cattle.	Sheep.	Swine.
1903.				
November	11	20	1,935	
December		20	143	
1904.				
April	1	85	16	
May	17	238	182	
June	8	242	365	26
July	3	212	278	
August	9	46	220	
September	6	20	341	
October	4	36	1,955	9
	59	919	5,435	35

ANIMALS inspected for Import.

——	Horses.	Cattle.	Sheep.	Swine.
... .	4	.....	....	
	4	.....	....	

I have the honour to be, sir,
Your obedient servant,

A. A. LECKIE,
Inspector.

The Honourable
The Minister of Agriculture.
Ottawa.

(J. A. COUTURE, D.V.S.)

QUEBEC, P.Q., October 31, 1904.

SIR,—I have the honour to send my annual report for the twelve months ended to-day. During that period we have admitted into this quarantine station 857 animals being :—

Cattle	286
Sheep	370
Swine	144
Goats	57
Total	857

The cattle were of the following breeds :—

Shorthorns	100
Galloways	81
Holsteins	41
Ayrshires	25
Simmenthales	18
Aberdeen Angus	9
Brown Swiss	8
Herefords	2
West-Highland	1
Kerry	1
Total	286

The destination of these cattle was as follows :—

Shorthorns	for Canada	99	For United States		1
Galloways	"	—	"		81
Holsteins	"	—	"		41
Simmenthales	"	—	"		18
Brown Swiss	"	—	"		8
Ayrshires	"	25	"		—
Aberdeen Angus	"	9	"		—
Herefords	"	2	"		—
West-Highland	"	1	"		—
Kerry	"	1	"		—
Total		137			149

The sheep comprised eleven breeds as follows :—

Shropshires	147
Oxfords	57
Cotswolds	55
Hampshires	40
South Downs	25
Lincolns	14
Dorsets	9
Cheviots	8
Unknown	6
Romney Marsh	5
Leicesters	4
Total	370

The destination of these sheep was as follows :—

Shropshires	for Canada	133	For United States		14
Oxfords	"	35	"		22
Cotswolds	"	47	"		8
Hampshires	"	4	"		36
South Downs	"	21	"		4
Lincolns	"	14	"		—
Dorsets	"	8	"		1
Cheviots	"	—	"		8
Unknown	"	—	"		6
Romney Marsh	"	5	"		—
Leicesters	"	4	"		—
Total		271			99

The swine belonged to the following breeds :—

Yorkshires	98
Berkshires	44
Poland China	2
Total	144

The goats belonged to the following breeds :—

Toggenburg	27,	being 15 for Canada and 12 for United States.
Saanan eighteen,	being four for Canada and fourteen for United States.	
Nubian	1	for Canada.
Murcia	2	"
Alpine	3	"
Maltese	6	"
Total... ...	57	

There were seven deaths—being 2 calves and 5 goats.
Five calves were born in quarantine.
There were no contagious diseases.

I have the honour to be, sir,
Your obedient servant,
J. A. COUTURE.
Superintendent.

(W. H. PETHICK, V.S.)

ANTIGONISH, N.S., October 31, 1904.

SIR,—I have the honour to inclose herewith a report dealing briefly with the work conducted at the experiment station at Antigonish during the year just ended. As the experiments now in train have not yet been extended over a sufficient length of time to warrant us in forming definite conclusions which if too hastily arrived at may later on be found incorrect and misleading, I presume that an extended report will not be expected. Detailed reports in all matters in connection with the work have from time to time been forwarded to the Veterinary Director General.

Under Dr. Rutherford's instruction, I have had the honour of conducting a number of experiments with a view of answering, if possible, the following questions :—

1. Is Pictou Cattle Disease contagious ?
(a.) By means of infected stables ?
(b.) By direct contact with diseased animals ?
2. Is this disease caused by the ingestion of Ragwort (Senecio Jacobea).
3. Does feeding (good or poor) predispose or render more or less liable to disease ?
4. Medicinal treatment of this disease.

Experiment No. 1.

To learn if this disease is contagious through the medium of infected stables, if so, does good or poor feeding render more or less liable to disease.

In this experiment sixteen young animals are employed, they are housed in an old frame stable in which thirty-six head of cattle had previously died of Pictou cattle disease, these animals are divided into lots of four and fed daily as follows :—

A—D, sufficient hay fed twice daily, 4 pounds grain mixture.
E—H, " " " 2 " "
I—Z, " " " without grain.
M—P, a restricted allowance of hay "

The hay fed in this stable is mixed clover and timothy, absolutely free from ragwort, imported from Quebec.

This experiment began November 24, 1903, and up to the present all the animals appear to be in excellent health and condition.

Experiment No. 2.

To decide whether the disease is caused by the ingestion of ragwort (Senecio Jacobea) if so, does good or poor feeding render more or less liable to disease.

In this test sixteen young animals are employed and housed in a new isolated stable and have never been in contact with the disease or exposed to contagion in any manner.

These animals are subdivided into lots of four, and fed daily as follows:—

1—4 sufficient hay containing Ragwort, 4 pounds grain mixture.
5—8 " " " 2 " "
9—12 " " " without grain.
13—16 a restricted allowance of hay containing Ragwort, without grain.

The hay feed in this test is natural grasses with a liberal mixture of ragwort.

The grain mixture consists of barley, oats and bran.

The experiment in feeding began November 24, 1903.

Animal No. 16 died of Pictou cattle disease, on July 19, 1904.
" 8 " " " " Sept. 8, "
" 11 " " " " Sept. 12 "

Experiment No. 3.

To ascertain if the feeding of 'Ragwort' (cured by itself) would produce the disease.

In this test two healthy young animals were employed. No 17 was fed twice daily on chopped Ragwort with very little bran. No. 18 was fed twice daily on chopped oat straw with very little bran.

The feeding began on November 24, 1903. No. 17 died of Pictou cattle disease on July 22, 1904; at the time of writing No. 18 appears to in good health.

Contact experiment.

To ascertain whether the disease is contagious by direct contact with animals affected with the malady.

In this test two young animals, one of which had been well fed, the other rather poorly fed during the early winter, were placed in an isolated stable and tied in the same stall with a steer which was suffering with Pictou cattle disease. These animals were fed (upon imported hay) out of the same manger and watered from the one pail, also ran together in a small pen where the manure was allowed to accumulate and later on (in the summer) the contact animals were kept in an inclosure with other animals affected with the disease. This experiment began on April 7, 1904, and was repeated on June 17, and again on July 19, the diseased animals with which those were in contact usually living about 12 days.

At this date, animals appear in good health and are in fine condition.

Treatment.

Those who are familiar with the nature of this disease (hepatic cirrhosis) will agree that a cure can hardly be expected and our only hope is to learn the cause, then advise the best means of prevention. Yet we appear to have had marked results from the use of some drugs in arresting the progress of the disease, at least for a time.

Our experiments along this line are very incomplete and it is necessary that the animals under treatment, should be under observation for a much longer time, and indeed, killed and autopsies held before any conclusion as to the value of medicinal agents can be arrived at.

Purgatives repeated occasionally and the daily administration of strychnine and iron, the former subcutaneously, together with careful feeding has certainly prolonged the life, and indeed brought into good condition three animals which have been under observation for some months. How long this condition will last, time alone can tell. The following record of a case may be of interest. You will notice that the acute symptoms disappear under the 'strychnine treatment' to return when it is suspended, but later on some more permanent improvement is observed.

Treatment of Pictou Cattle Disease.

Grade Ayrshire cow, six years old, should calve May 16, 1904, general appearance would indicate Pictou cattle disease. Temperature 100, pulse 74, quick and weak, variable appetite, diarrhœa. The owner Mr. D. McLellan, stated that this cow has been failing for some weeks.

March 16. Gave purgative, followed by strychnine and iron daily.
" 21. Improvement in appetite. Temperature 100, pulse 70.
" 30. General improvement, faeces almost normal.
April 10. General improvement, faeces quite normal.
" 16. Medicine discontinued.
" 19. Mr. McLellan reports the return of symptoms.
" 20. Slight diarrhœa, general condition rather unfavourable.
" 24. Gave fresh supply of medicine.
" 26. Again improving faeces almost normal.
May 12. Calved to-day, weak, otherwise condition favourable.
June 10. Much improvement, out at pasture.
July 10. Has gained much in flesh and appears to be in good health.

This treatment has been administered in other four cases, two of which have given very similar results, while in two cases the animals seemed to improve for a short time, acute symptoms returning, after which drugs had little or no effect in improving the condition, the animals dying of Pictou cattle disease in a few weeks.

On May 10, I had the honour of receiving instructions from the Veterinary Director General to deal with all cases of Pictou cattle disease when occurring in this county. In the discharge of this duty I have made 62 trips to different parts of the country, travelling in all about 1,200 miles, and have caused to be slaughtered 38 head of cattle, for which $384 was paid in compensation.

The enclosed chart* will give name and address of owners in each case, number of animals destroyed, sex, year of greatest mortality on each farm, number of cattle comprising each herd, and other information which may be of interest to you.

Although the loss in the county has not been as great as usual, yet I regret to state that the disease has this year claimed 'new territory,' particularly to the south this fact with the discovery of the disease in Prince Edward Island, and the probability that it exists elsewhere, has caused much public interest to be taken in the work at the experiment station.

I think that you will agree that the experiments so far conducted give promise of practical results, and I am glad to learn that it is the intention of the Veterinary Director General, who has kept a very close supervision of the work, to continue the experiments now in train, with the addition of others, over at least another year, when, I

* Not printed.

trust, more definite knowledge will be gained, and which will enable you to advise such measures as will lead to the prevention of this disease.

I have the honour to be, sir,
Your obedient servant,
W. H. PETHICK,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(GEORGE TOWNSEND, D.V.S.)

NEW GLASGOW, N.S., October 31, 1904.

SIR,—Please find a tabulated report of work during 1903-04.* You will see by my notes in report that I done the quarantine work in Antigonish and Pictou counties during November, December and January of this year; from February to the end of October only in Pictou county. In September and October of this year the indemnities are two-thirds instead of one-third, as heretofore.

I have the honour to be, sir,
Your obedient servant,
GEORGE TOWNSEND,
Inspector.

(F. S. MACDONALD, V.S.)

SOURIS, P.E.I., October 31, 1904.

SIR,—I have the honour to submit to you a summary of my work for the year ending October 31, 1904.

As it has already been shown the much-dreaded Pictou cattle disease exists in some districts in Prince Edward Island. Not being familiar with this disease and its symptoms, I was instructed by Dr. Rutherford to go to Pictou county when sent for by Doctors Townsend and Pethick for the purpose of getting all the information possible in connection with this disease. This I accordingly did.

Since August last the department has paid compensation to the owners of the cattle affected by this disease and ordered to be slaughtered by me.

The followng is a statement of the number of cattle slaughtered and the amounts paid to the owners :

	Slaughtered.	Amount paid.
August	3	$20 00
September	2	18 00
October	3	50 00
		88 00

I have the honour to be, sir,
Your obedient servant,
F. S. MACDONALD,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

*Not printed.

(V. T. DAUBIGNY, M.V.)

TERREBONNE, P.Q., October 31, 1904.

Monsieur,—J'ai l'honneur de vous adresser le rapport des inspections que j'ai faites à la demande du Vétérinaire Directeur Général, du 1er novembre 1903 au 1er novembre 1904.

SERVICE DE LA QUARANTAINE.

Le 16 février 1904, chez Mr. F. G. Clark, à Stanbridge à Scott farm, pour inspecter 22 cochons, soi-disant malades ; ils étaient en bonne santé.

19 juillet 1904 au clos d'équarrissage de Saint-Laurent pour faire l'autopsie d'une jument morte du charbon, appartenant à M. Charles Descarie de Dorval, P.Q.

28 juillet 1904 visite chez ce même Charles Decarie pour séquestrer ses animaux logés sur sa ferme dudit lieu afin qu'ils soient vaccinés.

24 octobre 1904 à Rectory Hill, Mégantic, chez Mr. H. A. Dickson, pour faire l'examen d'animaux soi-disant malades, tel n'était pas les cas, du moins quant à ceux que j'ai visités; l'inspection sera peut-être continuée ultérieurement.

J'ai l'honneur d'être, monsieur le ministre,

Votre bien dévoué serviteur,

V. T. DAUBIGNY,

Inspecteur.

A l'Honorable Ministre de l'Agriculture,
Ottawa.

(JOHN D. DUCHÊNE, D.V.S.)

QUEBEC, QUE., October 31, 1904.

SIR,—I have the honour to submit to you my report for the year ending October 31, 1904.

During the year I have examined ten horses suspected to be affected with glanders and tested eight of them with mallein, of which five have reacted; one has been destroyed and four are still under treatment.

There has been an outbreak of hog cholera in the county of Quebec, but with the assistance of Dr. J. D. Whyte its spreading has been promptly checked.

I am just now investigating an outbreak of sheep-scab in the county of Yamaska, Que.

I have the honour to be, sir,

Your obedient servant,

JOHN D. DUCHENE,

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(J. D. WHYTE, D.V.S.)

SHERBROOKE, October 31, 1904.

SIR,—I have the honour to submit to you my report for the year ending October 31, 1904.

HOG CHOLERA.

As I had been stationed at Chatham, Ont., sometime previous to October 31, 1903, assisting Dr. M. B. Perdue in dealing with the outbreak of hog cholera in that district, I continued there until November 7, 1903. In company with Dr. J. D. Duchêne, of Quebec city, I dealt with an outbreak of hog cholera at Charlesbourg, province of Quebec.

SUSPECTED HOG CHOLERA.

Upon receiving instructions, I visited Shawinigan Falls, P.Q., where hog cholera was suspected, 125 having died, but upon investigation found the deaths due to injudicious feeding.

Being instructed, I visited the slaughter houses at Point Lévis, where hogs from Western Ontario are slaughtered and gave instructions as to cleansing and disinfection, and disposition of the refuse, and when at Point Lévis inquired into cleansing and disinfection of cars and cremation of refuse, giving instructions for the same.

GLANDERS.

During the year I have tested 123 horses with mallein, 58 of which reacted, 30 being destroyed, 3 were destroyed on clinical symptoms only, total 33, 18 being retested twice, 7 being retested three times, 4 ceased reacting on second test, making a total of horses tested, 148. A large proportion of these horses were tested within a radius of a few miles from St. Hyacinthe, P.Q., it being a trading centre. A number of cheap horses purchased in Montreal are brought there and traded, the most of the outbreaks can be traced to those horses.

TUBERCULOSIS.

During the year I have tested two head of cattle imported from the United States, at the port of Mansonville, P.Q., which passed the test. Have also tested nineteen head of cattle for export to South Africa, three of which reacted. Have tested eighty-eight head of cattle which were not for export, eight of which reacted. Total tested one hundred and nine.

MANGE.

An outbreak of mange in horses in the county of Megantic, P.Q., came under my supervision, in which eighteen farms were placed under quarantine, twenty-seven horses were involved, all recovered after proper treatment, some of them were badly diseased.

ANTHRAX.

Upon receiving instructions I visited Isle du Moine in the River St. Lawrence, parish of Ste. Anne de Sorel, P.Q., to investigate an outbreak amongst the animals at pasture on that island, about one hundred had died previous to my visit, at the begin-

ning of the outbreak. The carcasses were not buried nor any precautions taken to prevent the spread of the disease. I performed a post-mortem on a colt but was unable to obtain reliable material for the pathologist. According to the statements of the caretakers of the island, this colt did not present the same appearance after death as the other animals, not having any bloody discharges from natural openings, and rigor mortis being present. I had the carcasses properly disposed of and the disease is now stamped out. A man inoculated himself while skinning one of the animals and died in three days, his physician diagnosed his case as anthrax.

RHEUMATISM.

I visited Lambton, Beauce Co., P.Q., to investigate a supposed outbreak of a contagious disease. Upon inquiry I found that the animals had been ailing for some length of time and as some got so stiff that they were unable to rise a few of those were destroyed, the rest recovered.

Inspected at the port of Mansonville, P.Q., two buffaloes which were imported from the United States for British Columbia.

Inspected at the port of Sherbrooke, P.Q., eleven head of cattle imported from the United States for exhibition purposes.

I have the honour to be, sir,

Your obedient servant,

J. D. WHYTE,

Inspector.

The Honourable

The Minister of Agriculture,

Ottawa.

(Professor Andrew Smith, M.R.C.V.S.)

Toronto, October 31, 1904.

Sir,—I have the honour to submit the following brief report on the health of the domestic animals in the province of Ontario during the past year.

HORSES

Have been generally healthy. A few cases of glanders have occurred, which have been attended to by the inspectors and reported to the department.

CATTLE.

There have been no signs of enzootic or epizootic disease among cattle.

SWINE.

Some outbreaks of hog cholera have occurred in the western part of the province, but the disease is under control.

ANDREW SMITH, F.R.C.V.S.,

Chief Ontario Inspector.

The Honourable

The Minister of Agriculture,

Ottawa.

(T. E. Watson, V.S.)

Niagara Falls, South, October 31, 1904.

Sir,—I have the honour to report that few diseases of a contagious character have appeared in this section during the past year.

Hog cholera which has in previous years prevailed to some extent seems to have been stamped out, not a single case having come under my notice this year.

The following are animals imported and quarantined where necessary, during the year, all of which were healthy :

Swine	7
Sheep	105
Cattle	5
Horses	2

I have the honour to be, sir,
Your obedient servant,
T. E. WATSON, V.S.,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(F. A. Jones, V.S.)

Windsor, Ont., October 31, 1904.

Sir,—I have the honour to submit my report of stock inspected at the Windsor quarantine station for the year ending October 31, 1904.

The swine imported were of good quality.

There have been no diseased animals in quarantine, other stock requiring inspection were in a healthy conidtion.

The following is a statement of animals received into quarantine, also stock requiring inspection.

For Export.

Cattle	11
Swine	1
Sheep	11

For Import.

Horses	18
Cattle	416
Swine	61
Sheep	240

I have the honour to be, sir,
Your obedient servant,
F. A. JONES,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(ARTHUR BROWN, V.S.)

SARNIA, Ont., October 31, 1904.

SIR,—I have the honour to submit my report of work done for the Department of Agriculture from November 1, 1903, to October 31, 1904.

In addition to performing my duties as inspector of quarantine at this port, I have slaughtered hogs, having hog cholera, on two farms in Sarnia township, and quarantined them for same, and examined a great number of stock cars, entering Canada from the United States, as to cleanliness, finding it necessary to return some of them.

The following animals have been inspected by me during the past year, the hogs having been placed in quarantine the required time.

For Import.

Cattle	54
Horses	229
Sheep	630
Swine	41
Goats	7

I found it necessary to reject eighty-five of the horses, on account of not having proper health certificates. On October 17 and 18, thirty-one hogs, returning from St. Louis Exposition, were placed in quarantine. On October 29, some of the hogs showed symptoms of hog cholera. Two days later one died. I destroyed another and held a post mortem, which confirmed my diagnosis of hog cholera, but with the free use of disinfectants and isolation, I hope to confine the disease to one herd, but at this date cannot tell how severe the attack may be.

I have the honour to be, sir,

Your obedient servant,

ARTHUR BROWN,

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(M. B. PERDUE, V.S.)

CHATHAM, October 31, 1904.

SIR,—I beg to submit, herewith, my annual report for the year ending October 31, 1904.

The disease most prevalent and in fact almost the only infectious disease among animals in this district is hog cholera.

During the year 105 outbreaks occurred, involving the slaughter of 3,011 hogs. These cases were dealt with principally by Drs. Orchard, Philps and myself. The services of the local inspectors were not utilized to any extent in dealing with out-

breaks of the disease, with the exception of Dr. Rowe of Blenheim, who dealt with eighteen cases in that vicinity.

The services of Dr. Kime of Chatham, and Dr. Thorne of Wallaceburg, were chiefly confined to the inspection of shipments.

In this district, the following townships are under quarantine, Tilbury East, West and North, Raleigh, Chatham, Dover, Harwich and Walpole Island, and out of this area, the shipment of fat hogs for immediate slaughter is allowed subject to inspection.

During the year 286 cars of hogs for shipment have been inspected by the different officers operating in this district. The total number of hogs inspected for shipment being 24,143.

In January last, I was instructed by the Veterinary Director General to attend all farmers' institute meetings in this district, to discuss hog cholera and its regulations. Dr. Philps and myself attended all meetings inside the infected area, after the institute meetings were completed, I advertised and we held a number of special meetings in the different villages throughout the infected district. These meetings had an excellent effect in the way of spreading correct ideas as to the nature of hog cholera and the regulations governing it.

It is very satisfactory to note, that in the past year the outbreak was not nearly so extensive, there being 105 outbreaks, involving the slaughter of 3,011 hogs, compared with 207 outbreaks involving the slaughter of 6,543 hogs in the previous year, this being due, chiefly, to the much improved system of dealing with the disease, ordered by the Veterinary Director General.

I have the honour to be, sir,

Your obedient servant,

M. B. PERDUE,

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(GEO. W. ORCHARD, V.S.)

WINDSOR, October 31, 1904.

SIR,—I beg leave to submit to you my report for the year ending October 31, 1904.

During the past year my work has been chiefly in the quarantined area in the counties of Kent and Essex, and consisted of dealing with outbreaks of hog cholera, inspection of shipments of live hogs and visiting farms already under quarantine, to see if they have been cleansed and disinfected in a satisfactory manner.

From November 1, 1903, to October 31, 1904, I have dealt with thirty-eight cases of hog cholera, involving the slaughter of 1,153 hogs, all of these cases but five being in the quarantined area; of these five cases four were in Essex and one in Lambton county, near Petrolea.

During the year just passed, I inspected at the various shipping points in the quarantined district, 71 cars containing 6,394 fat hogs for immediate slaughter, and consigned direct to various packing houses, mostly to Hamilton and Toronto, and in a few cases to Montreal, Lévis, Quebec and Palmerston, Ont.

At the beginning of the year starting November 1, 1904, there were a great many farms, previously placed under quarantine for hog cholera; of these, I visited and in-

spected 127, and found that the cleansing and disinfecting regulations, ordered by the Department of Agriculture, had on 124 of these farms, been faithfully carried out and a recommend for their release was forwarded to the department.

I have the honour to be, sir,

Your obedient servant,

GEO. W. ORCHARD,

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(M. PHILIPS, V.S.)

CHATHAM, October 31, 1904.

SIR,—I have the honour to submit herewith my annual report, from the date of my appointment, December 1, 1903, to October 31, 1904. Acting on instructions from the Veterinary Director General, on December 1, I proceeded to Chatham and worked under the direction of M. B. Perdue, and have since been dealing with hog cholera in the counties of Kent and Essex. I have had occasion to order the slaughter of 187 hogs on account of hog cholera. I have inspected 2,481 hogs for shipment at points inside the quarantined district. In addition to this, I have inspected a number of quarantined farms. For particulars, I beg to refer you to the detailed reports forwarded to your department by me from time to time on all work done by me.

I have the honour to be, sir,

Your obedient servant,

M. PHILPS,

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(JOS. KIME, JR., V.S.)

CHATHAM, October 31, 1904.

SIR,—I have the honour to submit to you my report of work done by me during the past year, from November 1, 1903, to October 31, 1904.

Inspected thirteen carloads of hogs for shipment. Number of hogs inspected, 1,155. Slaughtered hogs on farm of James Doolittle, Dover township, fifty-five hogs in all.

All other reports reported to M. B. Perdue, or Dr. Orchard, V.S., officers in control of this district.

I have the honour to be, sir,

Your obedient servant,

JOS. KIME, Jr.,

Inspector.

The Honourable
The Minister of Agriculture.
Ottawa.

(W. B. ROWE, V.S.)

BLENHEIM, October 31, 1904

SIR,—I beg to submit herewith my annual report for the year ending October 31, 1904.

During the year, I have dealt with eighteen cases of hog cholera, involving the slaughter of 317 hogs.

I inspected forty-one cars of hogs for shipment from points inside the quarantined district. The total number of hogs shipped under my inspection being 4,633.

In addition to this work, I have inspected thirty-eight farms for the release of quarantine.

I am glad to state that no other diseases of a contagious nature has come under my notice during the year.

I have the honour to be, sir,

Your obedient servant,

W. B. ROWE,

Inspector.

The Honourable
The Minister of Agriculture.
Ottawa.

(J. R. THORNE, V.S.)

WALLACEBURG, October 31, 1904.

SIR,—I have the honour to report that during the year ending October 31, 1904, I examined twenty-eight cargoes of hogs shipped from this place and that such cargoes contained 2,771 animals, all of which I found in a healthy and thrifty condition.

Hog cholera continues to appear in this district, eleven outbreaks of the disease having been reported at my office during the year, six of which were from the township of Chatham, four from the township of Dover, both in the county of Kent, and one case from the township of Sombra in the country of Lambton.

I believe that the change in the rate of compensation for contact hogs will have a most beneficial effect in that it will induce owners who suspect disease to exist in their herds to be more prompt in reporting suspected cases.

I have the honour to be, sir,

Your obedient servant,

J. R. THORNE,

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(William Stubbs, V.S.)

Caledon, Ont., October 31, 1904.

Sir,—I have the honour to submit to you my annual report for the year ending October 31, 1904.

During the year, under instructions from the department, I have tested with tuberculin, forty-nine pure-bred cattle for export, four of which reacted.

January 26, 1904. I visited Aaron township, where fatal disease among cattle had broken out.

May 16, 1904. I examined a consignment of Galloway bulls from Mr. D. McCrae of Guelph, for the Indian department, N.W.T., and found them to be in fair condition, and good individual animals.

Commencing on June 2, 1904, and ending on October 13, 1904, I regularly visited the market at Toronto every Tuesday and Thursday, also the Union Stock Yards at Toronto Junction, every Monday, and with the exception of the four animals already reported, I found the stock coming from the surrounding country into these markets, remarkably free from any kind of disease.

I paid special attention to sheep and failed to discover any signs of scab.

The cars carrying hogs from quarantined districts were all thoroughly cleaned and disinfected. In fact, I find that the railway authorities are quite anxious to have those regulations carried out.

There were no hogs re-shipped from Toronto, as they were all consigned there for immediate slaughter, and appeared to have arrived in a healthy condition.

During this time, on October 5, 1904, having been informed that black-leg broke out in Caledon, I visited the farm on lot 21, first concession, and found that two calves had adready died and one other was dying. I had the carcasses carefully removed and burned.

Also on September 29, 1904, I visited a farm near Belmont, but was unable to find any disease among the cattle in that locality.

From October 17, 1904, until October 28, 1904, I visited farms in the neighbourhood of Listowel, Myrtle, Balsam, Belmont, Delaware and Lisle, but failed to discover anything of a serious nature affecting the live stock in any of these localities. The reports of which I fully reported to the department at the time.

I have the honour to be,sir,

Your obedient servant,

WILLIAM STUBBS,

Inspector.

The Honourable

The Minister of Agriculture,

Ottawa.

(J. H. Tennent, V.S.)

London, October 31, 1904.

Sir,—I have the honour to submit my annual report for the year ending October 31, 1904.

During the year I have tested with tuberculin sixty-eight head of pure-bred cattle owned by twenty two different breeders for export to the United States, four of which reacted and one was suspicious.

I also tested for glanders with mallein at the following places : Glencoe, three horses, not diseased; Poplar Hill, three horses, one reacted to the test also showing clinical symptoms it was destroyed and the carcass cremated, the others were placed under quarantine and after forty days retested giving no reaction. Eckfrid township, one horse did not respond to the mallein test; Lambeth, three horses gave no reaction; Canboro township, Haldimand county, two horses, one reacted, showing clinical symptoms which was destroyed and deeply buried. The other was placed under quarantine but died from other cause before the time for making the retest; Haldimand county, Darlington Road, two horses got no reaction. I visited Ripley, Huron county, and Thamesford, Middlesex county, where it was reported that a number of cattle died suddenly under peculiar circumstances after careful examination I found the disease to be of a non-contagious character and due to improper care and feeding.

Hog cholera was reported to have broken out at Arkona, Middlesex county and Wroxeter, Huron county. I visited these places and found in both cases after holding post-mortem that the animals were affected with stomach and bowel trouble due to injudicious feeding and bad hygienic surroundings. I also visited Pine River, Huron county to look over the district where hog cholera was prevalent last year. I did not find a single case showing that the disease was effectually stamped out. I visited St. Thomas, Elgin county, to ascertain whether sheep-scab had affected the flocks in that vicinity or not. After carefully examining the sheep owned by all the different breeders I had to report that the disease did not exist in that locality.

I visited the following places:—Petrolea, Sarnia, London Junction, Brantford and London to inspect and see if cars carrying hogs from the quarantined district to these places were properly cleaned and disinfected before re-shipping. I found that the railway company had neglected to attend to it. I had considerable trouble in getting the work done by the railway officials.

The health of animals in this district has generally been good. A mild epidemic of influenza occurred among horses during the fall months.

I have the honour to be, sir,
Your obedient servant,
J. H. TENNENT,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(G. W. HIGGINSON, V.S.)

ROCKLAND, October 31, 1904.

SIR,—I have the honour to submit this my annual report for the year ending October 31, 1904.

I have submitted to the tuberculin test, during the year, 127 head of cattle for export, of which 10 reacted. I also tested 99 other cattle, of which one reacted.

I have also dealt, during the year, with several outbreaks of glanders in Ontario and Quebec.

In June there was an outbreak of mange in the county of Prescott, in which Dr. Moore and myself had under quarantine, sixty-five farms and private institutions, the greater number of which at present have been released.

I have the honour to be sir,
Your obedient servant,
G. W. HIGGINSON,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(W. W. STORK, V.S.)

BRAMPTON, Ont., October 31, 1904.

SIR,—I have the honour to submit my report for the year ending October 31, 1904.

During the past year I have regularly attended the Toronto markets which have now become distributing centres for a very large amount of live stock. I have inspected the stock, consisting of cattle, sheep and hogs ; looked after the disinfecting of numerous cars and urged the keeping of the premises in as sanitary a condition as possible.

The new market at Toronto Junction, known as the 'Union Stock Yard,' is now doing business. The facilities for handling stock and the sanitary arrangements are all that could be desired.

At the Toronto market, known as 'The Western Cattle Market,' a process of renovation has been carried on within the last few months. New and commodious pens have been erected, a large area of new flooring laid down and much attention given to the sanitary equipment.

During the year I have made numerous investigations of reported outbreaks of contagious diseases among stock and in all cases a full detailed report of these has been forwarded to your department, a synopsis of which is as follows :—

DISEASES OF HOGS.

During the winter months I visited several places in the province of Ontario where trouble amongst hogs was said to exist.

A large percentage of the trouble was among young pigs, and was nothing more or less than a form of bronchitis superinduced no doubt, by the severity of the weather. The percentage of deaths was comparatively small.

In one district, namely, that of Muskoka, I have to report the outbreak of cholera among hogs, but fortunately the epidemic did not attain anything like serious proportions.

The disease first appeared in a pen of hogs at Huntsville and from there was directly traceable to two places in the vicinity. All the hogs on these places (both ailing and in contact) were slaughtered as soon as possible after the trouble became known, the premises quarantined and disinfected and the contagion thereby gotten rid of.

GLANDERS.

During the year I have inspected some isolated cases of suspected glanders and in all cases where the disease was proven to exist, the animals were promptly destroyed and the carcasses either cremated or deeply buried in lime, contact animals were submitted to the mallein test with the result that two animals, which reacted without showing well-marked clinical symptoms of the disease, were destroyed by me.

The amendment of the Contagious Disease Act, whereby the owners will be in part compensated for the loss of an animal (reacting to mallein without showing clinical symptoms) will greatly facilitate the eradication of the malady.

CATTLE AND SHEEP.

During the year I have tested with tuberculin several consignments of cattle about to be exported.

Scab in sheep, which was somewhat troublesome in one or two counties in Western Ontario during the summer of 1903, appears to have become eradicated.

WESTERN RANCH HORSES.

I have attended several sales of western unbroken ranche horses in Toronto and vicinity, keeping a sharp lookout for mange, glanders or any other trouble which might make its appearance in this class of horses.

I have the honour to be, sir,

W. W. STORK,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(G. H. BELAIRE, V.S.)

PEMBROKE, Ont., October 31, 1904.

SIR,—I have the honour to submit to you a short summary of my work done for the year ending October 31, 1904.

During that time I have tested with mallein, eighty-eight horses, twenty-two of which reacted; two horses that presented well marked clinical symptoms of glanders, and which reacted to the mallein test, were destroyed, one horse showing clinical symptoms of glanders was destroyed without application of the test, making in all, three horses destroyed. Of the reacting horses that did not show any clinical symptoms of glanders, I have tested twenty-two twice, six three times, and one four times, of the twenty-two that have reacted twenty have on application of 2, 3 and 4 tests finally ceased to react, and to all appearances are healthy and useful animals, all of which are branded and still under our supervision, one horse that was destroyed presenting clinical symptoms of glanders, revealed on post-mortem, well-defined glander tubercles in the lungs, and glands within and without the thorax.

I regret to say that glanders is still prevalent in this district, and this work is surrounded by a host of difficulties more particularly due to the manner in which horses are worked and handled in the lumber camps, during the winter months.

Infected horses if any, are not reported by the owners, and the result is that when a case of glanders comes under our notice we are hampered to a great extent in ascertaining the whereabouts of the origin of the disease.

I am pleased to state that with the exception of glanders, no disease of a contagious character affecting horses and other domestic animals, has come under my notice.

The method of dealing with glanders adopted by the Veterinary Director General, has proven very satisfactory to the public in general, and very instructive in demonstrating the action of mallein on glanders, its curative effects, and the different reactions obtained on different horses.

I have the honour to be, sir,

Your obedient servant,
GEO. H. BELAIRE,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(CHAS. LITTLE, V.S.)

WINNIPEG, October 31, 1904.

SIR,—I have the honour to submit my annual report of inspections for the year ending October 31, 1904. The following is the number of animals imported from the United States :—

Horses	5,850
Mules	500
Cattle	4,300
Sheep	177
Swine	285

I have tested six head of pure bred cattle for export. As directed by the Veterinary Director General, I kept a strict watch on all the cattle shipped from the western ranches so as to prevent any affected with mange escaping, that might have been overlooked by the inspectors when loading, or had developed in transit. The amount shipped through to date is (32,705) and (8,136) shipped to Winnipeg for home consumption. I am pleased to state that only a very few with any appearance of mange arrived here.

There has been a good many small outbreaks of symptomatic anthrax this season, otherwise the cattle have been very healthy. There has been a good many cases of glanders in the province this season, but, very few cases of swamp fever reported.

I hove the honour to be, sir,

Your obedient servant,

CHAS. LITTLE,

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(F. TORRANCE, D.V.S.)

WINNIPEG, October 31, 1904.

SIR,—I have the honour to submit to you the following report on the investigation into the pathology of swamp fever in horses.

Work began on June 15, when I was able to obtain the first case, a chestnut horse purchased from a Russian residing a few miles from Winnipeg. The owner could speak very little English, so that I was unable to get a full history of the case, and only learned that he had bought the horse a few months before, and that it had been lately getting thin and weak.

The symptoms presented on examination, were characteristic of the disease—profound anaemia, weakness, emaciation, wobbling gait, unhealthy skin, pulse sixty and temperature 101·5.

The horse was placed in the laboratory stable, well fed and cared for and from day to day the blood was examined for organisms, especially with a view to the discovery of trypanosomes. In this line we made use of a method described by Dr. Coplin at a meeting of a pathological society of Philadelphia. The suspected blood is

placed in a centrifuge and the trypanosomata 'having a lower specific gravity than the red cells and a higher specific gravity than the white cells will collect in a white ring between the erythrocytes and the superimposed ring of white cells.' In addition to this we examined slides of fresh blood and also made stained films, using various methods and staining fluids to detect any intracorpuscular bodies such as the organism that causes Texas fever in cattle. I regret to report that all these observations proved negative and in none of the slides examined was anything detected which could be considered a micro-parasite. Another method tried was to draw off some blood into a sterile flask containing peptone solution, plain bouillon, or sugar bouillon. The flasks were then placed in the incubator and after variable periods of time examined and sub-cultures made from them—in every case they were found sterile.

The first horse died on August 20, and I was unable to procure any fresh cases. It was unfortunately during this period, that I had a visit from Drs. Moore of Ithaca and Kelly of Albany, N.Y., who had been in the west to examine the cases of 'maladie du coit' in quarantine. They were shown the laboratory and discussed our methods of work, but I greatly regretted that I could not show these experts a case of fever and get the benefit of their views.

The following notes of the first case, will give an idea of the course of the disease and the methods of investigation employed by Dr. Bell and myself.

Case No. 1.

June 15. A chestnut horse about eight years of age purchased from Russian Jew, June 15, by Dr. Torrance.

Emaciated, hair long and dirty, gait wobbling, mucous membranes blanched but no petechiae. Temperature 101·5, pulse 60.

June 16. Drew off an ordinary centrifuge tube full of blood from jugular. Centrifugalized it for half an hour. Drew off with a fine pipette some of the leucocytic layer and examined a number of slides for trypanosomes. Noted in several slides the inclusion of what seemed to be red blood corpuscles in leucocytes. Blood was also taken by puncturing skin and the fresh slides examined.

Blood count (Thoma-Zeiss) red blood corpuscles, 1,940,000, Haemoglobin, 20. Count of leucocytes failed, but they were apparently not increased.

June 18.—Stained prepared slips with eosin and Loeffler's methylene-blue, eosin and saturated watery methylene-blue, eosin and carbolized thionin. In some instances I thought I saw several round bodies in the red blood corpuscles. These were sometimes single, sometimes arranged in groups of four. In one slide I found a distinctly nucleated corpuscle.

June 20.—Temperature of horse keeps at about 101·2. Drew off an ordinary centrifuge tube from jugular. Centrifugalized for half an hour. Examined smears from different levels of tube, but found nothing. Also examined a number of fresh smears obtained from skin—saw the same small round bodies mentioned above, but convinced myself they were not intra-corpuscular.

June 22.—Made a large number of cover slips from blood obtained by puncturing skin.

June 23.—Temperature last evening went up to 104, but examinations of fresh blood specimens showed nothing.

June 24.—Examined a number of slides of fresh blood drawn from skin. Plan adopted was first to make a general survey of the whole field with the low power so as to detect any movement among the corpuscles such as a trypanosome would make. Then to use the one-sixth objective and ultimately the oil-immersion. Nothing could be seen in the red blood corpuscles. Numerous small non-motile bodies, about one-sixth the diameter of a red cell were seen in these preparations. They were, however,

unequal in size, and were probably debris. Some very small erythrocytes were also noted.

June 25.—Prepared a number of cover slips for staining.

June 27.—Tried to make a blood count, but the horse moved and blood got up into bulb. Haemoglobin 15. Leucocytes 5.600. Collected a centrifuge tube full of blood from the jugular and treated it as before. Examined it at all levels for trypanosomata, but found none.

June 30.—Examined fresh preparations of blood.

July 2.—Made a number of films for staining.

July 4.—Red blood corpuscles, 1,800,000, Haemglobin, 15, Oedema of dependent parts increasing.

July 6.—Examined fresh blood slides and saw an unusual number of the peculiar round bodies mentioned above. They could often be seen arranged in groups, and think they were undoubtedly debris.

July 10.—Made more films and stained.

July 19.—R.B.C., 2,980,000, Haemoglobin 20. A distinct improvement, but examination of slides was as on previous occasions, negative.

July 21.—Examined fresh preparations of blood.

July 23.—Again examined blood and made films for staining.

July 25.—R.B.C. 3,120,000, Haemoglobin 25, Leucocytes 6,000. Also examined smears.

July 27.—Made films from blood, obtained by puncturing skin. Found nothing.

July 31.—Made cultures from blood by drawing off a considerable quantity from jugular into a flask containing ordinary bouillon.

August 1.—Drew off blood in same manner into flask containing peptone water.

August 6.—Examined culture made July 31 and made sub-cultures on agar and blood serum.

August 9.—R.B.C. 2,960,000, Leucocytes 6,200. This was at time of a marked rise of temperature. Fresh specimens of blood and dried films stained with Loeffler's methylene-blue and eosin, were examined. No haematozoa or other organisms noted.

August 13.—Fresh blood slides examined.

August 17.—Sub-cultures made August 6 have remained sterile.

August 20.—Horse was found dead. Post-mortem was not performed for several hours after death, owing to unavoidable circumstances.

Two cases of swamp fever that we had the opportunity of observing this summer were practically identical in character, being both of the distinctly chronic type. Unfortunately, death occurred in each case during the night, so that an immediate autopsy was impossible and all cultures obtained from tissues were useless.

The post-mortem findings in such cases are fairly constant. The animal is emaciated, its coat is in an unhealthy condition, and there are almost always extensive abrasions of the skin. There is swelling of the dependent parts of the abdominal wall and legs, due to a sero-glatinous infiltration of the sub-cutaneous connective tissue of parts. The mucous membranes are very pale but only in a small proportion of cases do they show petechiae.

The internal organs are more or less blanched, though this is not so noticeable in the case of the liver. The lungs are generally normal in appearance. The heart is enlarged, and shows fatty degeneration of its musculature. The fat about it is often in a condition known as serous degeneration. The liver is slightly enlarged and microscopical sections show degenerative changes in the centre of lobules, with a round celled infiltration of Glisson's Capsule. These cells are of the size and character of lymphocytes. There is also a considerable deposition of iron holding pigment. The spleen is the organ most markedly affected, being much increased in size and very firm. Microscopical examination shows deposition of iron holding pigment

all through the pulp and also a peculiar proliferation of the endothelial cells of the lymph spaces.

The kidney shows little change as far as the epithelium lining the tubes is concerned, but the same infiltration of lymphocytes is to be seen, particularly about the blood vessels.

The feature that stands out above all others in this disease is the widespread destruction of red blood corpuscles. In those which remain, there is frequently considerable variation in size, but deformity and nucleated forms are only rarely met with.

There is also a decided decrease in the number of leucocytes though the relative proportion of the different varieties is not altered.

Our main efforts were directed to discovering the agent at the root of this haemolytic process. Blood slides were examined by scores and at all times, but no trypanosome or haematozoon was ever detected. What the source of this haemolytic substance is, we can at present only surmise. Possibly it may be formed in the intestinal tract, by the action of some peculiar bacteria, and absorbed into the blood stream from there.

We propose on the next opportunity to direct our attention particularly in this direction.

Attached is chart of temperature of the case cited.

I have the honour to be, sir,

Your obedient servant,

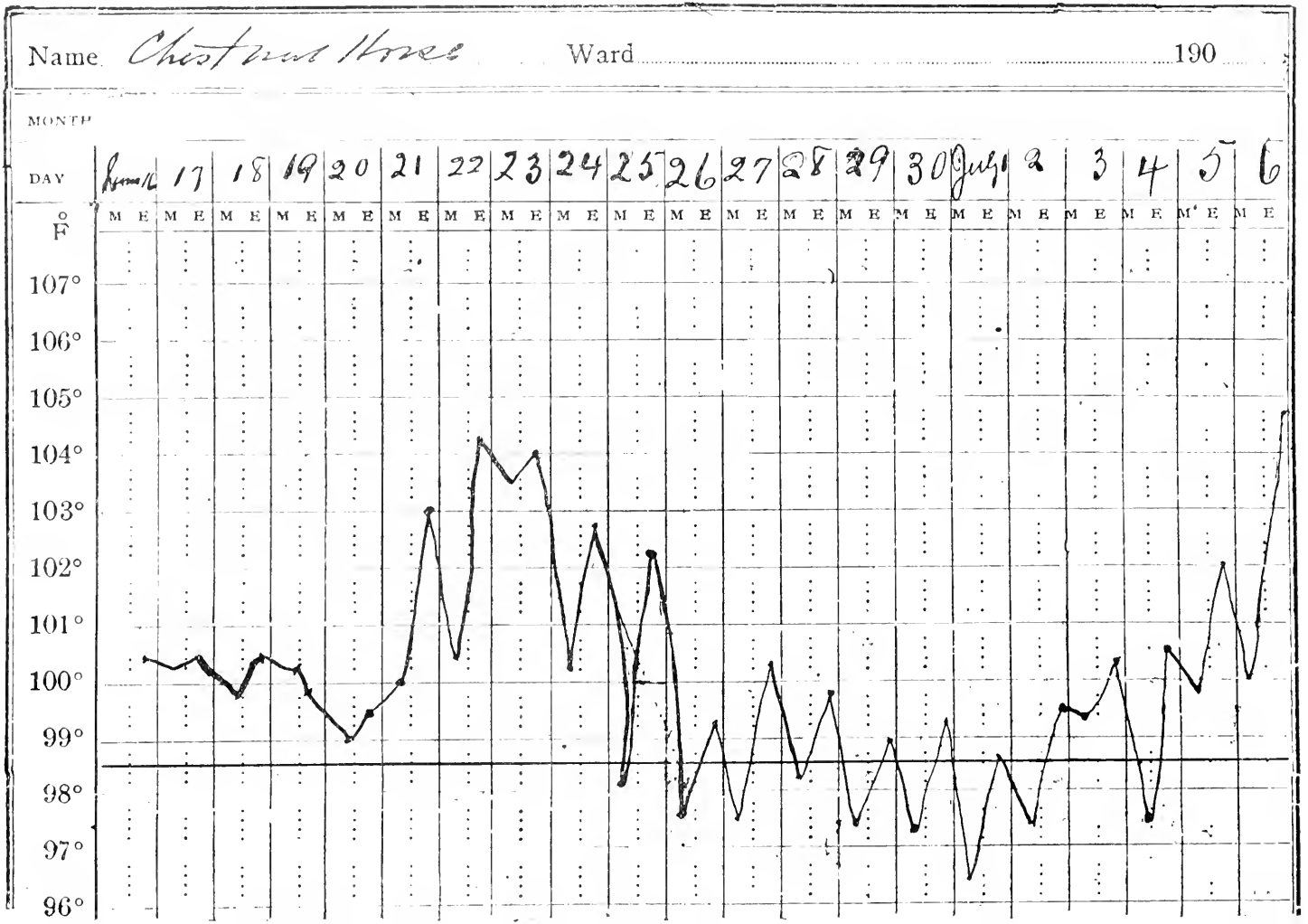
F. TORRANCE,

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

TEMPERATURE CHART, ETC.

Name Chestnut House Ward 190



TEMPERATURE CHART, ETC.

Name Chestnut Horse Ward 190

MONTH July

DAY 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28

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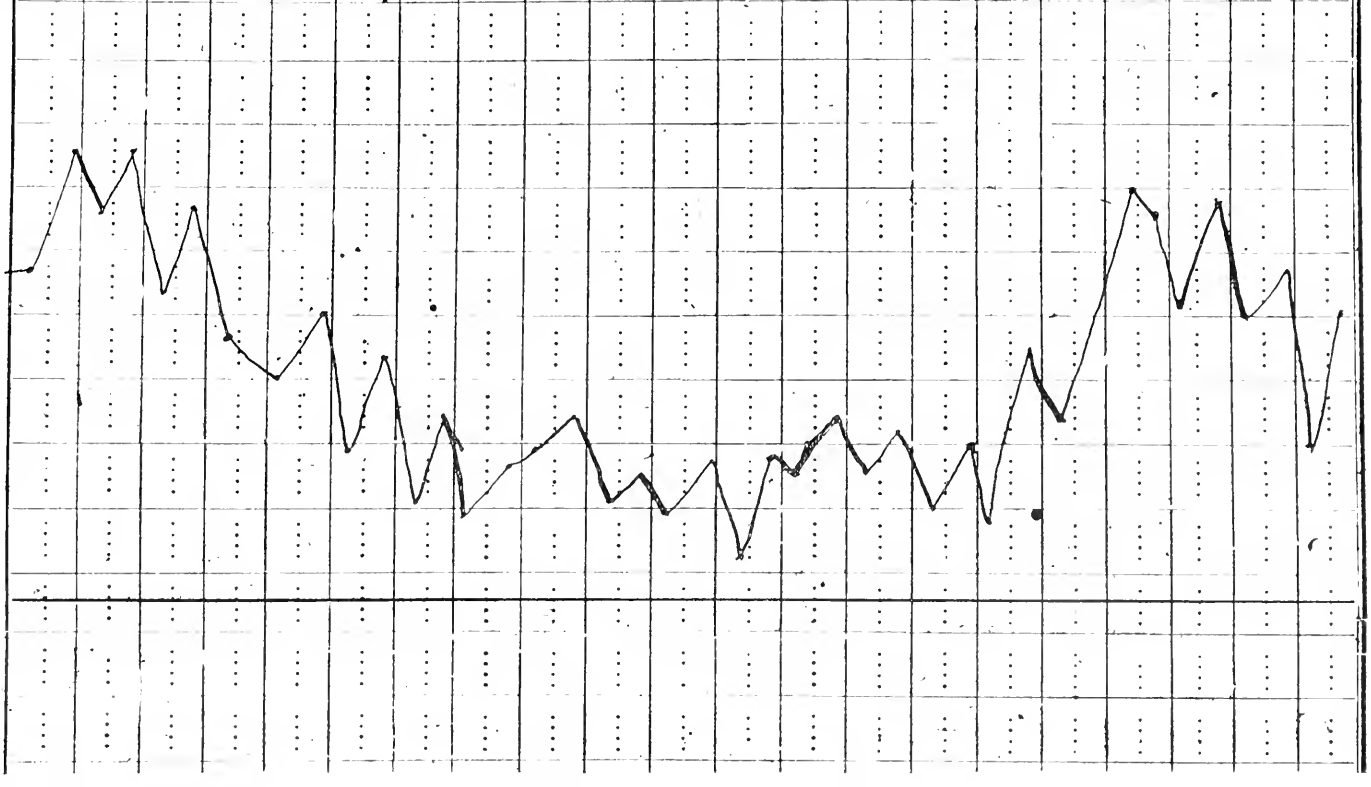

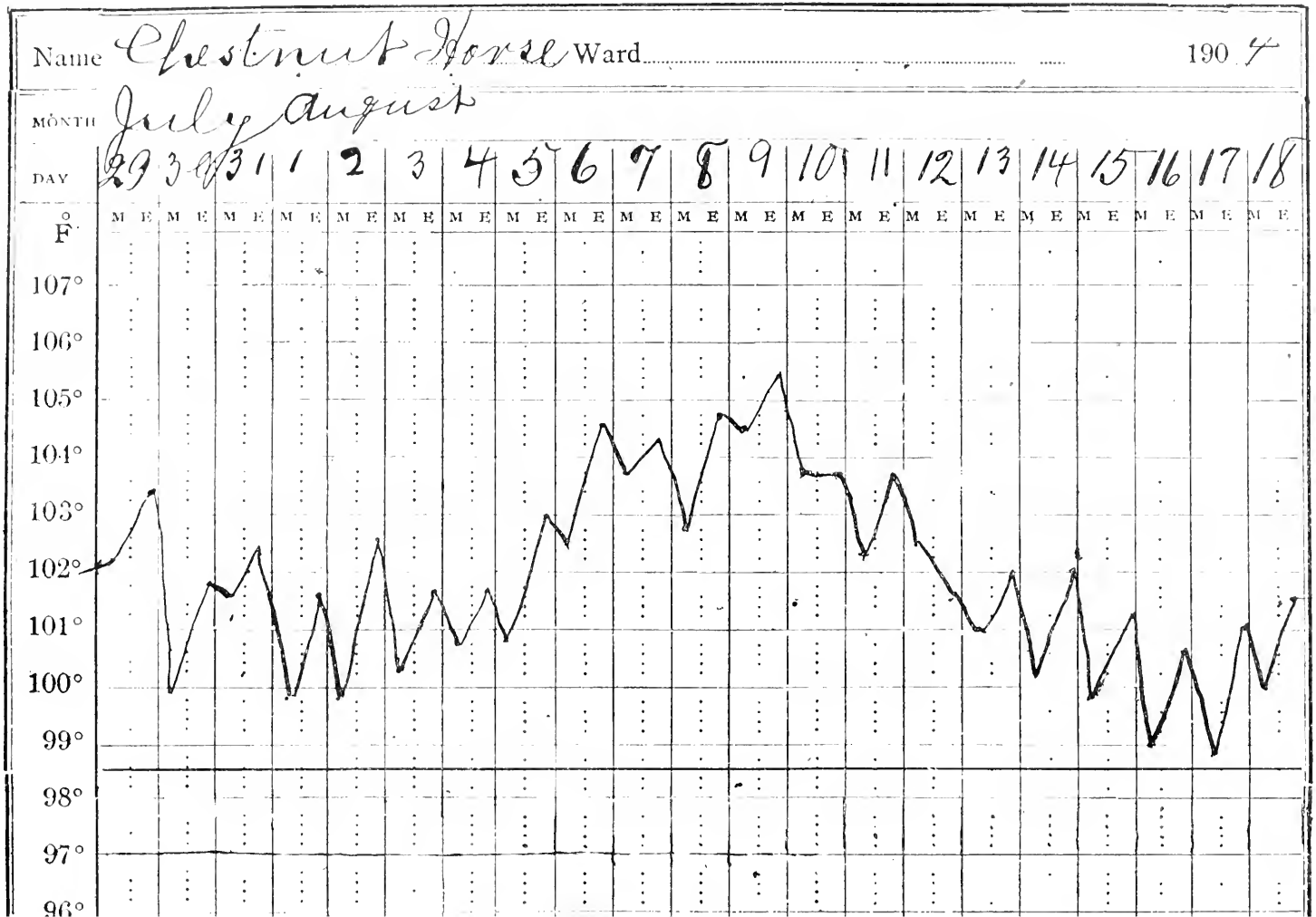
Name Chestnut Horse Ward 190 4
MONTH July August
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TEMPERATURE CHART, ETC.

Name Chestnut Horse Ward 190 7

MONTH August

DAY 19 20

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Rose

(P. A. ROBINSON, V.S.)

EMERSON, Man., October 31, 1904.

SIR,—I beg to submit herewith my annual report of stock inspected at the ports of Emerson and Gretna for the year ending October 31, 1904. I have included separately, all range horses as this class of stock did not all pass Customs entry here, but were all subject to inspection. Apart from the importation of range horses, most of the other entries were settlers destined to various points throughout Manitoba and the Territories. Attached is a tabulated statement showing importations for each month. Not printed.

I have the honour to be, sir,

Your obedient servant,

P. A. ROBINSON.

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(M. B. ROMBOUGH, V.S.)

MORDEN, Man., October 31, 1904.

SIR,—Inclosed please find list of animals inspected at this port for the year ending November 1, 1904.

Horses	93	head.
Cattle	90	"
Swine	3	"

This stock belonged to settlers coming into Canada from the United States.

I have the honour to be, sir,

Your obedient servant,

M. B. ROMBOUGH,

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(R. D. SCURFIELD, M.D.V.)

CRYSTAL CITY, Man., October 31, 1904.

SIR,—I have the honour to report on the health of the animals inspected by me in this district. The most of our entries here are settlers from North Dakota, United States, who cross the boundary here destined principally to the North-west Territories. The stock imported has been of an average quality, some very good cattle having been brought in by settlers. During the past year I have had to refuse entries of

cases of mange, principally among the breeds who enter here for the different reservations. Glanders has fortunately been rare and what cases I found were slaughtered with the consent of the owners. A few cases of actinomycosis were found, but settlers now realize the necessity of keeping healthy animals.

I am glad to report that the farmers in my district are beginnng to realize the importance of the tuberculin test, having tested quite a few herds during the past year.

I have the honour to be, sir,

Your obedient servant,

R. D. SCURFIELD,

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(W. LITTLE, V.S.)

BOISSEVAIN, October 31, 1904.

SIR,—I have the honour to submit the following report of animals inspected by me at Deloraine, Manitoba, and Killarney, Manitoba, during the year ending October 31, 1904.
1904.

Animals inspected at Deloraine :—

Horses	245
Mules	5
Cattle	132

Of the above, seventy-one horses were for sale, the balance of all other animals were settlers' effects.

Animals inspected at Killarney :—

Horses	343
Mules	6
Cattle	213
Sheep	1
Swine	26

Of the above animals, twenty-eight horses were for sale, the balance of all other animals were settlers' effects.

I have the honour to be, sir,

Your obedient servant,

W. LITTLE,

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(W. LESLIE, V.S.)

MELITA, October 31, 1904.

SIR,—I have the honour to submit the following report of stock inspected by me at the customs port of Melita for the year ending October 31, 1904.

Horses	276
Mules	3
Cattle	81
Swine	8

Of the above 181 horses and one mule were for sale, the balance of the stock were settlers' effects.

I have the honour to be, sir,
Your obedient servant,
W. LESLIE,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(J. A. STEVENSON, V.S.)

CARMAN, Man., October 31, 1904.

SIR,—I have the honour to submit to you my report of work done for the Department of Agriculture from the time of my appointment till October 31, 1904.

There has been a serious outbreak of mange amongst horses in the northern part of the county of Dufferin and at one time I had twenty-seven farms under quarantine but I am pleased to state that at the present time I have the outbreak well under control. The disease was brought into this district by a band of western horses last winter for sale.

I also had an outbreak of mange in cattle on a farm in the county of South Norfolk, but have it also under control.

There have been a few cases of glanders in this district which were handled by provincial authorities.

Black-quarter has been much less prevalent than in former years due no doubt to the more extensive use of preventive inoculation.

There is still a large number of cases of swamp fever which have been due no doubt to the unusual amount of rain this past summer.

I have the honour to be, sir,
Your obedient servant,
J. A. STEVENSON,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(A. McMillan, V.S.)

Virden, Man., October 31, 1904.

Sir,—I have the honour to report that in June last an outbreak of mange in horses was reported to me, and upon investigation discovered that it was correct. In June I established eight quarantines, five in July, four in August, one in September and one in October, making a total of nineteen. The animals have all been successfully treated with the exception of three quarantines that are remaining.

I have the honour to be, sir,

Your obedient servant,

A. McMILLAN,

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(A. Bowen Perry.)

Regina, October 31, 1904.

Sir,—I have the honour to forward my annual report for the twelve months ended October 31, 1904, together with the reports of the various veterinary inspectors, which detail the work performed by them.

Mcleod District—Inspector Burnett, V.S.
Maple Creek District—S.-Sgt. Coristine, V.S.
Calgary District—S.-Sgt. McVeigh, V.S.
Prince Albert and Battleford Districts—S.-Sgt. Mountford, V.S.
Edmonton District—S.-Sgt. Sweetapple, V.S.
Lethbridge District—S.-Sgt. Gallivan, V.S.
Cardston District—S.-Sgt. Oliver, V.S.
Pendant d'Oreille District—S.-Sgt. Gray, V.S.
Coutts District—S.-Sgt. Johnstone, V.S.
North Portal District—S.-Sgt. Richards, V.S.
Regina District—S.-Sgt. Ayre, V.S.
" S.-Sgt. Mitchell, V.S
" S.-Sgt. Meakings, V.S.
Wood Mountain District—S.-Sgt. Perry, V.S.
Medicine Hat District—Dr. Hargrave, V.S.

Attached is a statement showing names of veterinary inspectors permanently employed and their present stations. Reports are forwarded from all these inspectors with the exception of S.-Sgt. White, whose report is included in that of Inspector Burnett; S.-Sgt. Busselle, who is on temporary duty in Calgary District, and S.-Sgt. Brock, who is on special duty in connection with the dipping order in the Maple Creek District. Sometimes it is found necessary to employ outside veterinary surgeons, particularly during the export season, but this is never done except when absolutely necessary.

List of Veterinary Inspectors Permanently Employed and where Stationed.

Inspector Burnett, J. F., Macleod.
Staff-Sergt. White, S. A., Macleod.
" Ayre, H. T., Regina.
" Mitchell, W., Regina.
" Meakings, E. A., Regina.
" Richards, S. C., North Portal.
" Perry, F., Wood Mountain.
" Coristine, D., Maple Creek.
" Brock, A., Maple Creek.
" Busselle, A. W., Calgary.
" McVeigh, C. H., Calgary.
" Gallivan, M. V., Lethbridge.
" Gray, F. M., Pendant d'Oreille.
" Oliver, E. C., Cardston.
" Johnstone, H. J., Coutts.
" Sweetapple, J. H., Fort Saskatchewan.
" Mountford, J. J., Prince Albert.
Dr. Hargrave, J. C., Medicine Hat.

PORTS OF ENTRY AND QUARANTINE STATIONS AT BOUNDARY.

North Portal.—Staff-Sergeant Richards, V.S., in charge. Seventeen thousand nine hundred and fifty-four cattle, 8,178 horses, 586 mules, 796 swine, and 99 sheep were inspected at this post. Twelve head of horses and 67 head of cattle were detained and quarantined, suffering from mange, they were treated, and when clean, allowed to proceed to their destinations. Entries at this station are much less than last year, particularly as regards Mexican cattle. Heavy floods and consequent blockades of the railways in spring and early summer contributed very much in lessening the number.

Wood Mountain.—Staff-Sergeant Perry, V.S., in charge. At this port 907 horses and 9 cattle were entered. None were rejected. Commodious corrals and a complete dipping plant have been constructed at this point, and though no imported cattle were dipped, all of the stock-men's cattle have been dipped in this vat, which has given great satisfaction.

Pendant d'Oreille.—This is a new station on Milk river, and has been in charge of Staff-Sergeant Gray, V.S. Two thousand two hundred and thirty cattle, 354 horses, 6,150 sheep and 7 mules were imported and inspected at this station. None were rejected. Corrals and dipping vat were constructed at this point, and are of very substantial construction and complete in detail. They are now being used to dip cattle running in that section.

Coutts.—Staff-Sergeant Johnstone, V.S., in charge at this point. Three thousand six hundred and eighty cattle, 25 mules, 33 swine and 7,482 sheep were inspected, 16 head of cattle were held as affected with mange, treated, and sent to their destination. Facilities for inspecting and treating stock are very complete, commodious corrals, squeezers, &c., and dipping vat having been constructed.

Cardston.—Staff-Sergeant Oliver, V.S., in charge. There were inspected at this point 2,278 cattle, 2,111 horses and 5 mules. The same class of corrals and dipping vat as were constructed at Pendant d'Oreille and Coutts are being built at a point south of Cardston near the boundary line where one of our detachments is to be stationed, and will be ready for use for the coming season.

There is a long stretch between Wood Mountain and Pendant d'Oreille without a quarantine station, and a site for such a station has now been chosen near the boundary line a little west of the old trail from Fort Walsh to Fort Assiniboine, Montana.

Persons bringing stock into the Cypress Hills have meanwhile been permitted to report and have their stock examined at Maple Creek.

All the corrals and dipping plants were constructed under our own direct supervision, and the work is of the most substantial and thorough description, and when the station is constructed at the point above mentioned, the system of stations will be very thorough and efficient.

At Maple Creek, a temporary station, Staff-Sergeant Coristine inspected the following imports,—209 horses, 2,645 cattle, and 1,737 sheep; and at Lethbridge and Macleod, 16 horses and 136 cattle were inspected.

The various inspectors have been very careful in carrying out the instructions contained in the Quarantine Regulations and I am certain, but very few infringements have occurred.

HORSES.

Glanders.—Glanders, I regret to report, is very prevalent in some parts of the Territories. In Regina district, which includes work done in Assiniboia as far west as Caron, 173 horses have been destroyed. In Prince Albert district 94 were destroyed, and in Calgary district 42 horses . In Maple Creek district no cases were reported, and only one suspected case in the Macleod and Lethbridge districts. In Edmonton district 18 horses were destroyed, a very marked decrease from last year. Every effort is being made to eradicate this disease. A large number of the farmers in Assiniboia turn out their horses in the winter and this has proved a fruitful source of spreading the disease, as if there is one diseased horse in the district, he is sure to come in contact with numerous horses and spread the disease. Badly ventilated and foul stables are, I believe, largely responsible for the spread of the disease. Amongst quite a large class of people, any kind of a hole appears to be good enough to keep a horse in. Particularly in district of Eastern Assiniboia, the services of several veterinary inspectors were constantly required to deal with the numerous reported cases. Some horses were tested again and again, and reacted, without showing any clinical symptoms.

By the Order in Council of September 19 last, compensation may be paid for animals reacting to the mallein test but showing no clinical symptoms. Detailed instructions and the necessary printed forms have been received from the Veterinary Director General and all horses at present in quarantine as having reacted to the mallein test will again be re-tested by two veterinary inspectors, and if reaction follows will be destroyed. Under the new regulations the work of veterinary inspectors in regard to glanders will be considerably lessened, as many horses continue to react at each successive test, and it will likely be more acceptable to the owners to have the animal destroyed at once and receive compensation, than to be obliged to isolate it for many months.

Mange.—Mange has been more prevalent amongst horses, I am sorry to say. In certain sections of the western part of the Territories it has been quite too common. Every precaution has been taken to eradicate the disease. Herds in which the disease appeared, were closely quarantined and treated, and in most instances with success but it still lingers in places. In Calgary district there are five herds still in quarantine, and in Cypress Hills, one herd. In the northern and eastern part of the Territories some cases have occured, at various points, but the inspectors state that such cases did not originate there, but occurred in horses brought from the west. It is hoped that with the treatment already given, and the compulsory dipping, that the disease may soon disappear.

Maladie du Coit. This is a new disease in the Territories, and its occurrence has created much alarm amongst horse owners in the western territories. Prompt and energetic measures have been taken for the suppression and stamping out of this disease. In the infected districts, no stallion is now allowed to run at large. About 3,000 mares have been examined and at present there are 246 confined in the quar-

antine pasture west of Lethbridge. What the disposal of these mares is to be, has not been determined at present, but a recent Order in Council authorizes animals suffering from this disease to be destroyed on an order from a veterinary inspector, and compensation on a certain scale allowed to their owners.

Inspector Burnett, V.S., has been in particular charge of this, and reports fully on it.

OTHER DISEASES.

Swamp fever and typhoid influenza, have not been so prevalent as in the past, but quite a number of settlers have suffered quite seriously.

Hoof disease, which is some years in the northern country has been very bad, has not been so serious during the past year.

The restrictions in the Quarantine Regulations, and the advanced value at which horses are now appraised, has been the means of decreasing the importation of unbroken horses of an undesirable type. One train load of Mexican ponies were imported in September and shipped to the west.

CATTLE.

Mange.—Mange is still and has been in some districts prevalent, and last winter caused considerable loss to stockmen. At a meeting of the Western Stock Association held last summer, this question was fully discussed, as it was becoming a serious matter. It was decided finally that compulsory dipping appeared to be the only remedy, and in consequence, a departmental order dated August 9, 1904, was passed, giving the boundaries of a large area of the territories this area to be an infected place, and ordering all cattle to be dipped twice at a certain interval in a certain solution between September 1, and October 31. Vats were built in various parts of the infected area, deputies were appointed by the various inspectors, to superintend the dipping, and in some sections the dipping has been virtually completed. In other sections prompt action was not taken by the stockmen, owing partly to ignorance of details, lack of energy, delay in getting the ingredients for the dip, or opposition to the measure. However, the season has been most propitious for such work and I trust to be able to report later that nearly all the stock in the infected area has been dipped. Owing to the lateness of the season when the orders for dipping were received, the work was not completed by October 31, and the returns not being in I am unable to send a report on the matter, but will forward as soon as possible.

No other disease of a contagious or infectious nature has existed in the Territories, and outside of mange, the cattle have been extremely healthy.

SHEEP.

Sheep have been very healthy throughout the Territories and no disease of a contagious or infectious nature has been reported. Importations of sheep have been small. Owing to scab and other diseases existing in the Northwestern States, care has been taken in inspecting sheep from those localities.

SWINE.

No disease has been reported as existing in the Territories. All swine imported were held at port of entry for fifteen days since the first of May last in accordance with quarantine regulations.

All thoroughbred stock imported, were tested for tuberculosis. There was only one suspected case, which is still in quarantine.

The sale of blacklegine has been small during the past year, the disease of blackleg not having, apparently, been prevalent.

The following is a statement of stock inspected for export:—

Place.	Horses.	Cattle.	Mules.	Remarks.
1904.				
Maple Creek	311	4,313		21 cattle rejected for mange.
Lethbridge	404	3,350	4	Local market.
Coutts		1,917		
Calgarry	1,737	17,991		127 cattle rejected for mange.
Macleod	1,320	12,447		
Medicine Hat	1,768	7,754		112 rejected mange.
Total	5,540	47,772	4	

The following is a statement of all stock inspected for importation:—

Place.	Horses.	Cattle.	Mules.	Sheep.	Swine.	Remarks.
1904.						
Maple Creek	209	2,645		1,737		
Macleod Dist. Cardston	2,111	2,278	5			
Lethbridge	16	136				
Coutts	3,642	3,680	25	7,482	33	16 cattle rejected for mange.
P. d'Oreille	354	2,230	7	6,150		
Regina Dist. Portal	8,178	17,954	580	99	794	12 horses rejected for mange.
Wood Mountain	907	9				1 cow for Actinomycosis.
Medicine Hat	146	104				67 cattle quarantined for mange.
Total	15,563	29,036	617	15,368	827	

INSPECTION FEES.

The amount collected from November 6, 1903 to October 31, 1904, was $6,174.36, which has been duly remitted to your department.

SALE OF BLACKLEGINE.

The sum of $38.80 has, during the same period, been remitted as proceeds of sale of blacklegine distributed from here and necessary outfits for administering same.

General.—The general work of the inspectors has increased very much during the past year, and of course the compulsory dipping order has taken up almost their undivided attention since September 1, last. Owing to the great prevalence of glanders in Eastern Assiniboia, it has been difficult at times to attend promptly to all cases reported, but the best possible has been done with the means at my disposal, and very few complaints have been received. Owners of diseased stock have in nearly every instance done everything, to facilitate the work of the inspectors and are fully alive to the value of the work that is being done to stamp out disease amongst their herds.

The Veterinary Director General has been kept fully informed of the work performed under my supervision and has visited the Territories and consulted with me on various matters during the past year.

I will forward as soon as received a full report on the compulsory dipping, but I am afraid this report will be somewhat delayed.

I have the honour to be, sir,

Your obedient servant,

A. B. PERRY,

Commissioner.

(J. F. BURNETT, V.S.)

MACLEOD, October 24, 1904.

SIR,—I have the honour to submit herewith my annual report of work performed for the Department of Agriculture for the year ending October 31, 1904.

Early in the year a number of animals owned in the vicinity of Lethbridge were found to be affected with maladie du coit. An effort was made to trace the disease to its origin, but without avail. As the disease was not known to exist in the North-western States, it became a matter of speculation as to where it did originate.

Since the first case was discovered, an examination has been made of about three thousand mares, and all showing the slightest suspicion of disease have been quarantined. A stop has been put to stallions running at large, and everything done to prevent its spread.

Mange among horses got quite a start again during last winter, but the owners worked at it, and I believe so far as this district is concerned, have it stamped out.

Mange among cattle appeared to be more prevalent than usual the past season and on animals that are affected the disease is showing up worse than is ordinarily the case. Those who have dipped for mange are well pleased with the result, and a number have informed me that their cattle are looking and doing better than they did before they were put through the vat.

On October 12, eighteen horses were brought in from Cardston for shipment from this point to Calgary, to be used on the irrigation ditch. One horse presenting rather suspicious symptoms, and as the horses had been together for some time and there being no place here to isolate them, I sent them back to Cardston for Staff-Sergt. Oliver to test.

I have the honour to be, sir,

Your obedient servant,

JNO. F. BURNETT,

Inspector.

To the Officer Commanding,
R.N.W.M. Police, Macleod.

(W. MITCHELL, V.S.)

REGINA, October 31, 1904.

SIR,—I have the honour, in compliance with your instructions, to forward the following quarantine report for Depot Division for the year ending the 31st ultimo, together with a tabulated statement embodying more detailed information as to the number of cases, character of the diseases, &c., that have come under the notice of the quarantine staff. Obviously, too, the extensive scope of country over which these operations have been extended, the extent and magnitude of the work involved, coupled with the limited space at one's disposal in a report of this kind, necessarily necessitates its restriction to a mere synopsis of the work actually performed. Suffice to say that in every instance where the suspected existence of contagious diseases have been brought before the notice of the authorities, the premises in question have been visited with the least possible delay by some member of the quarantine staff, and such action taken as seemed best calculated to protect not only the interests of the individual, but the community as well.

Naturally, of the contagious diseases that have come under the notice of the officials of this department, glanders as usual, has demanded a preponderating measure of attention. Certainly the number of cases of this disease dealt with during the past season has been without a precedent in the history of this country. But on the other hand the influx of settlers of agricultural proclivities into these agricultural sections of the west, implying as it does a corresponding increase in the representation of the equine species has been on a scale equally commensurate, and doubtless to this fact is to be ascribed, to a considerable extent, the apparent increase in the prevalence of this disease. Altogether, upwards of 217 horses and mules showing in each instance well-marked clinical symptoms of glanders have been destroyed in addition to which the mallein test has been applied to upwards of 1,038 animals that have been more or less exposed to the contagion.

After glanders, next in importance as engrossing the attention of the quarantine staff, especially in the eastern and northern portions of the district, has been contagious mange among the equine species. For in addition to several somewhat serious outbreaks of this disease among domesticated horses in certain localities, stray animals from the ranching districts to the north affected with the disease whose ownership could not be established, have been ever and anon drifting into the agricultural districts to the South, and in some instances appearing at points widely separated from their legitimate ranges, to the great annoyance of the resident horse owners.

In cases of this kind, however, advantage has been taken of the provisions of the 'Mange Order,' the offending animals isolated and tested at owners expense, or failing that source of recoupment, the animals are sold as the law provides.

I have the honour to be, sir,

Your obedient servant,

W. MITCHELL,

Vet. Staff-Sergt.

The Officer Commanding,
Regina District, Regina.

(F. PERRY, V.S.)

R. N. W. M. POLICE,
WOOD MOUNTAIN, October 28, 1904.

SIR,—I have the honour to forward you the following report of work done for the Agricultural Department for the twelve months ended October 31.

Number of animals inspected :—

Horses	907
Cattle	9
Sheep	—
Swine	—

Of these, 500 were passed on free entry, 447 of these being estrays from this side of the line.

Amount of inspection fees collected and forwarded from time to time, $203.90.

The demand for 'Blacklegine' has been much less than last year.

Glanders.—I am sorry to have to record one case of glanders in the district which has been free from this disease so long. An aged stallion of Mr. J. H. Thompson's having been destroyed by me on September 8.

Mange.—This disease made its appearance for the first time amongst the cattle in this district in December last. Where it was possible to stop affected stray cattle intermixing with our herds, I practically stamped out the disease.

Number of cattle inspected and license given for removal from infected area, 601. One settler having the disease in his herd notified me of his intention not to ship.

The new regulations with regard to inspection and discriminating between range stock and well broken horses, have been rigidly adhered to and after one party had been refused admission for want of proper certificates, there was no further trouble. The diminution in the number of horses entered for duty, is due partly to the new law regarding inspection and partly to the increased value placed on mares and stallions.

I have the honour to be, sir,
Your obedient servant,
F. PERRY, V.S.,
Staff-Sergt.

To the Commanding Officer,
N.W.M. Police, Wood Mountain.

(H. T. AYRE, V.S.)

REGINA, October 31, 1904.

SIR,—I have the honour to attach herewith a report of work done by Staff-Sergeants H. T. Ayre, Busselle, Meakings and Mitchell, for the Department of Agriculture *re* quarantine between November 1, 1903 and October 31, 1904.

I have the honour to be, sir,
Your obedient servant,
H. T. AYRE,
Vet. Staff-Sergt.

The Officer Commanding
R.N.W.M. Police, Regina District.

QUARANTINE work performed by Staff-Sgts. Ayre, Busselle, Meakings and Mitchell between Nov. 1, 1903, and Oct. 31, 1904.

Tested and Quarantined.	Tested and destroyed.	Destroyed without test.	Tested and no reaction.	Examined only and not tested or quarantined.	Tested more than once and ceased to react.					
					1	2	3	4	5	Total.
412	173	44	626	476	.....	50	6	24	6	1,817

Horses quarantined for mange 158
Cattle " " 82
Cattle tested for tuberculosis..... 19
Cattle destroyed " 5

One at File Hills, Indian reserve and four at the experimental farm, Indian Head.

H. T. AYRE,
Vet. Staff-Sergt.

(S. C. RICHARDS, D.V.S.)

PORTAL, October 27, 1904.

SIR,—I have the honour to forward my annual report of work performed at this port of entry for the Department of Agriculture. The following stock were inspected:

Horses..... 8,178
Cattle..... 17,954
Mules..... 580
Sheep..... 99
Swine..... 794

The inspection fees for this year amount to $2,461.55.

The following stock were rejected :—Twelve head of horses affected with mange; one cow affected with actinomycosis; sixty-seven cattle in all were detained here on account of mange, and after being treated according to the instructions were released from quarantine and allowed to proceed to destination.

The decrease in the total number of stock in comparison to last year is due more to falling off in the importation of Mexican cattle than to decrease in immigrant stock. The total decrease is also accounted for to a great extent by blockage of traffic on the railroad first of all due to heavy snow storms and followed by great floods, lasting for weeks during the very busiest time. As in former years the immigant stock were of good quality.

No improvements have been made in the way of accommodation for the unloading and feeding of stock, there is only one small yard here now quite inadequate for the purpose. Next spring it will be impossible to carefully inspect all the stock unless provisions are made to forestall the unloading and ample room made for feeding. It is also very essential to secure water there is none here in the yard. The restrictions

in the quarantine regulations and the charges in the appraising of horses for duty have been the means of decreasing the importation of unbroken horses—although in September one trainload of Mexican ponies were admitted.

I have the honour to be, sir,

Your obedient servant,

S. C. RICHARDS, S.S.

The Officer Commanding
N.W.M.P., Regina Dist.

(E. A. MEAKINGS, M.D.V.)

REGINA, October 31, 1904.

SIR,—I have the honour to forward the annual report on quarantine work done in the district.

Since entering the service four months ago, I have been working in this district on glanders. The cause of so much contagion is mainly due to farmers letting their horses run during the winter months, for instance, at Caron settlement, almost every case can be traced to a horse purchased at Moose Jaw during the fall and then immediately turned loose, much the same state of affairs exists at Coventry settlement, Drinkwater, and considerable difficulty is met with in locating these animals after the round-up. However, the general public realize the seriousness of this disease, and have with a few exceptions given me much help in the execution of my duty, but I find after an animal has reacted to the mallein test two or three times, showing no clinical symptoms and being in first-class condition, the farmers as a general rule become careless with their isolated horses.

I find that the number of horses which cease to react is very small and out of that number none, of them had a very high temperature or much local swelling at the first test.

There was a very serious outbreak at a ranche at Parkbeg, out of eighty-four horses tested twenty-seven reacted, four showing clinical symptoms. I experienced considerable difficulty in obtaining the normal temperature of these animals owing to excitement.

I have not had a case of mange in this district with one exception in which the owner had successfully treated previous to my visit.

I have the honour to be, sir,

Your obedient servant,

E. A. MEAKINGS,
Vet. Staff-Sergt.

The Officer Commanding,
R.N.W.M. Police, Regina District.

(J. J. MOUNTFORD, V.S.)

PRINCE ALBERT, October 31, 1904.

SIR,—I have the honour to request that you will forward to the Commisioners Office, Regina, the attached annual quarantine report of services performed for the Department of Agriculture for the year ended October 31, 1904.

I have the honour to be, sir,

Your obedient servant,

J. J. MOUNTFORD,

Vet. Staff-Sergt.

The Officer Commanding,
'F' Division, Prince Albert.

(D. CORISTINE, V.S.)

MAPLE CREEK, October 31, 1904.

SIR,—I have the honour to submit this the annual quarantine report of this district for the year ended October 31

With the exception of mange in cattle, no disease of a contagious or infectious nature has exhibited itself in stock in this district during the year.

This disease, however, prevailed to a far greater extent than usual, there being scarcely a bunch of cattle in the district free from it last winter and spring.

A result of the prevalence of mange last winter and spring was to convince cattlemen generally of the necessity of concerted action in rounding up and dipping their cattle as a means of prevention as well as cure, and found them in a mood to comply with the order of August 9, with very few exceptions.

Regarding compulsory treatment of cattle for mange, this order has been on the whole very satisfactorily carried out in this district, and fully ninety per cent of the cattle in this district will be satisfactorily treated by the end of the present year.

Dipping was by no means finished October 31, owing to the fact that a large number of cattlemen throughout the district were delayed in making their preparations to dip their cattle by difficulties in procuring sulphur, heating appliances, &c.

Fortunately, the weather continues favourable and a week or ten days more will see practically all the cattle in the district dipped or othrwise treated.

In a few cases ranchers are using chloro-naptholeum. I have notified them that this preparation is not recognized in the Order.

A suggestion which I wish to make in regard to treatment of cattle for mange is that hand treatment with any remedy be put out of the question altogether, for the reason that some are inclined even with one hundred or more head of cattle to say : 'I am going to treat my cattle by hand,' thereby causing a great deal of extra work in seeing that it is done and by delay, probably evading treating their cattle at all.

Again, in cases of this kind, it would take probably as many days as it would hours by dipping to do it thoroughly, and entail on the owner a much heavier expense and make it a matter of great difficulty for inspectors to see that it was properly done in

the case of a number of ranchers in different parts of the district proposing to treat their cattle in this way.

Dipping cattle in a properly constructed vat is, I believe, the cheapest, most successful and practical way of dealing with mange, and may be done simply and expediously by the ranchers, building a vat in every community where three or four thousand head of cattle can be got together within a reasonable distance.

As dipping of cattle is still going on in different parts of the district, and have not complete returns of cattle treated, I will make a special report on this subject. at an early date.

GLANDERS.

On November 1 and 2, 1903, I subjected to the mallein test four horses owned by Creswell and Day, of Rush Lake, they having been exposed to infection of glanders. There was no reaction or indication otherwise of the disease and the animals which were in quarantine were released in compliance with instructions from the Veterinary Director General, to whom report of cases and test charts had been forwarded.

MANGE IN HORSES.

A bunch of horses at Jas. McBains, Graburn, in which mange was found, was placed in quarantine by Dr. Hargrave of Medicine Hat, in November last. The supervision of these animals was handed over to me in May last. Notwithstanding repeated treatments, the disease still lingers in the bunch in one or two cases and they are still under close quarantine.

DISEASES IN SHEEP.

No disease of sheep has been reported to me during the year.

STATEMENT OF STOCK INSPECTED.

Imports.

Horses	209
Cattle	2,645
Sheep	1,737

Exports.

Cattle	2,659

Local Markets.

Cattle	1,654

Of the number of cattle presented for shipment export and local markets, I have found it necessary to reject twenty-one head on account of mange.

Local Markets.

Horses	351

The latter were inspected by myself at different periods at Medicine Hat, Dunmore and Walsh in absence of Dr. Hargrave.

Veterinary inspection fees collected on imports $411 79

I have the honour to be, sir,

Your obedient servant,

D. CORISTINE, V.S.S.

The Officer Commanding,
'A' Division, R.N.W.M. Police.

(J. C. HARGRAVE, D.V.S.)

MEDICINE HAT, October 31, 1904.

SIR,—I have the honour to submit the following report for the twelve months during October 31, 1904.

Number of cattle inspected and passed for shipment were 7,754 head and the number of horses inspected and passed for shipment 1,768 head.

Number rejected for mange, 112 ; number rejected for actinomycosis, 3.

A statement of these inspections is appended.

The number and classes of animals imported from the United States at this port of entry are here given :—

Horses	146
Mules	..
Cattle	104

One hundred and twenty-two (122) head were inspected free, being entered as settlers effects, and fees to the amount of thirty-three dollars and seventy-five cents ($33.75) collected on the balance. These figures show quite a falling off from those of last year, this is explained by the fact that on and after March 30, 1904, live stock was prohibited from entering at Medicine Hat, and with the exception of a few settlers, no stock was entered here after that date.

For the past twelve months, 550 black-leg vaccine (450 blackleginc, 100 double lymph) have been supplied, the sales amounting to fifty-seven dollars and forty cents ($57.40). The demand for vaccine during the past year was very little.

GLANDERS.

The number of horses destroyed for glanders during the past four years is as follows :—

1901	43
1902	21
1903	10
1904	11

Also number having reacted to mallein and still remaining under observation and control. Ten (10) head with the exception of one (1) horse all those destroyed and those still in quarantine were found in the Eagle Butte district and no doubt all contracted the infection from the same source. An endeavour has been made to test all the horses that have been exposed to the infection, but there is at this date still another herd that I propose testing. A statement of the horses affected with glanders is appended.

TUBERCULOSIS.

Fourteen (14) purebred Durham females for export to the United States were tested, none of which reacted.

MANGE.

Among cattle the mange last year, especially during the winter, was very prevalent, perhaps never so bad in this district, no headway seemed to be made by the hand-treatment of cattle and the compulsory dipping of all cattle was quite in order

and recognized as most beneficial by all the ranchers. Unfortunately it was left too late, and although the bulk of the dipping in this district is over, still it will not be finished before the twentieth of November.

The outbreak of mange among the horses, reported last year, assumed a very serious aspect before spring. This was no doubt due to the fact that the fall before, just as the round-up was finishing, the greater part of the range on the north side of the river was burnt, and the horses were turned loose with but very little done towards stamping out the disease. By spring about eighty per cent of the horses were affected and the loss during the winter in some of the herds amounted to at least twenty per cent. During the past summer splendid progress has been made towards stamping the disease out, and I venture to say that before winter sets in, we will have effectually cured all horses under our observation and control. No doubt a few cases remain at large, having been missed by both spring and fall round-ups.

Both psoroptic and sarcoptic mange exists among the horses, but the latter is much more prevalent. Both swimming and cage vats have been employed in dipping the horses, and every horse in the herd, whether affected or not, practically received the same treatment. To this fact, I think, can be attributed to a great extent our success.

I think we have demonstrated that the cage vat is the most satisfactory kind of vat to use in dipping horses. We have also demonstrated that two thorough applications of lime and sulphur dip (lime 10 pounds, sulphur 24 pounds, water 100 gallons) will effect a cure.

The South African official mange dip was used in a few cases, but for horses I consider it is too strong.

Good results were obtained by using as a hand application linseed oil, coal oil and sulphur, and I believe one thorough application will in most cases effect a cure.

Among the patent dips used were Little's Fluid dip, McGregor's dip, Toronto sheep dip, and chloro-naphtholeum dip, but the results were not so satisfactory, as when lime and sulphur dip was used.

The loss last year from tape-worm was very small, no doubt due to the precaution taken by the ranchers by feeding preventatives.

The loss of sheep from eating poisonous plants was also small, and nearly all shepherds were provided with permanganate of potash and alum powders.

During the summer several journeys were made to Lethbridge to assist Dr. Burnett in quarantine work at that place.

I have the honour to be, sir,

Your obedient servant,

J. C. HARGRAVE,

Inspector.

The Officer Commanding
'A' Division, R.N.W.M.P.

(M. V. GALLIVAN, V.S.)

LETHBRIDGE, ALTA., October 31, 1904.

SIR,—I have the honour to forward herewith my report of work done for the Department of Agriculture for year ending October 31, 1904. I took over the duties of veterinary staff-sergeant at this post on September 1, having been transferred from Depot division, Regina.

My report prior to above date has been compiled from records kept in orderly room.

I have been informed that a large number of cattle have been shipped from this district to points in Manitoba, Ontario and Quebec, the records of which were lost in the fire which destroyed the offices of this division on July 11. Superintendent Begin informs me that Inspector Burnett made most of the inspections which are not recorded here. Stock in general are in fair condition, and seem to be comparatively free from contagious diseases ; as yet only two cases of mange have been brought to my notice. Some 17,567 head of cattle have been dipped in my district for cure and prevention of above malady. I have not as yet seen any cases of actinomycosis.

During the past year a large quarantine pasture has been fenced and now contains 281 mares suffering from maladie du coit. I have visited said pasture several times in company with the Veterinary Director General and Inspector Burnett, but am unaware of the action to be taken by the department *re* the disposal of these mares.

I have the honour to be, sir,

Your obedient servant,

M. V. GALLIVAN,
Vet. Staff-Sergt.

The Officer Commanding,
R.N.W.M. Police, Lethbridge.

(H. M. GRAY, M.D.V.)

PENDANT D'OREILLE, October 31, 1904.

SIR,—I have the honour to submit herewith my annual report of work done for the Department of Agriculture for the year ended October 31, 1904. I was transferred here in June from Regina. Prior to that date all stock was sent to Coutts for inspection. Our dipping plant is now completed and giving entire satisfaction. Our facilities for inspecting stock are first-class as we now have a large and commodious stock yard. The settlers' stock are in first-class condition. Up to the present date very little mange showing among the cattle. This country is particularly free from contagious diseases, none having even been reported to me.

Total number of stock inspected coming into Canada at this port are as follows :—

Horses	354
Mules	7
Cattle	2,230
Sheep	6,150
Inspection Fees collected	$465.99

H. M. GRAY,
Staff-Sergt.

The Officer Commanding,
'K' Division, R.N.W.M. Police, Lethbridge.

(H. J. JOHNSTON, V.S.)

COUTTS, October 31, 1904.

SIR,—I have the honour to submit herewith my annual report of work done at this place for the Department of Agriculture for the year ended October 31, 1904.

There has been a great decrease in the number of stock coming into Canada at this port, as compared to that of last year. The quality of the stock has been very good and exceptionally free from disease only having on one occasion to reject any and those were rejected on account of mange, viz., 16 head of cattle.

The stock of the settlers in this district are in good condition and showing no signs of mange as yet, and I am pleased to state that we are free from any other contagious disease.

Our facilities for inspecting stock are much better than they were last year as we now have much larger yards.

During the year I tested with tuberculin fifty-nine head of cattle but got no reaction in any of them.

The total number of stock coming into Canada at this port is as follows:—

Horses	3,642
Mules	25
Cattle	3,680
Sheep	7,482
Swine	33

Total exports—cattle, 1,917.

Inspection fees collected, $1,452.76.

I have the honour to be, sir,

Your obedient servant,

H. J. JOHNSTON,

Vet. Staff-Sergt.

The Officer Commanding
'K' Division, R.N.W.M. Police,
Lethbridge.

(E. C. OLIVER, V.S.)

CARDSTON, ALTA., October 31, 1904.

SIR,—I have the honour to forward the annual report of work performed by me for the Department of Agriculture for the year ending October 31, 1904.

There were inspected for importation at this place :—

Cattle	2,278
Horses	2,111
Mules	5

Total amount of inspection fees collected, $894.55.

No contagious disease existed in stock of any kind with the exception of horse and cattle mange.

The past winter being mild no loss of stock occurred from exposeure to cold.

One case of suspected glanders was reported a few days ago. I examined this horse, had him isolated and will make a proper test as soon as possible.

I have the honour to be, sir,

Your obedient servant,

E. C. OLIVER, V.S.,

Vet Staff-Sergt.

The Officer Commanding
R.N.W.M. Police,
Macleod.

(C. H. McVeigh, V.S.)

Calgary, October 31, 1904.

Sir,—I have the honour to submit my annual report for the Department of Agriculture for the year ended October 31, 1904. I have to depend on the records in the office for the information herein contained.

Cattle mange was prevalent throughout this district during the winter, but has not shown up to any extent in the summer, and detection of this disease during the warm weather was difficult. The whole of my district has been under quarantine for mange for some years, and the recent government Order for compulsory dipping will be most beneficial, and will result no doubt in eradicating the disease in a year or two. I will say no more as to the results of this Order as I am rendering a separate report as soon as my returns are in.

The treatment of mange in horses has been given more attention by ranchers in general and a good deal of dipping has been done. The horses of the following owners are still under quarantine, but will be inspected shortly and no doubt released, as they have nearly all been dipped :—

Christie, W. L., High River.
McHugh Brothers, Gladys.
McDougall, W., High River.
Begg, R., Dunbow.
McLaughlin, J., High River.

Some trouble was caused by a sale of horses from W. L. Christie to Pugh, Livingstone &Hoadley. These horses were inspected before being sold and a bunch of about thirty not sold on account of mange. Pugh, Livingstone & Hoadley, turned their horses on the range and alarm was caused because they had been in contact with the disease. Veterinary Inspector Riddell, however, gathered and went over these horses twice and pronounced them clean, on the last occasion he inspected 408, one by one, in a chute.

Glanders has been found in nearly every part of the district. The attached list will show the number of horses destroyed for this disease, which curiously enough is the same as last year, viz.: forty-two. At this date there are some five or six animals awaiting re-test with mallein. I notice in the correspondence some trouble was caused by owners destroying horses for glanders and not keeping the hoof with the ER brand. I would suggest a foot note be printed on Form 48, 'Order of Veterinary Inspector as to disposal of re-acting animals,' warning owners on this point.

Every shipment of stock during the year was inspected, the numbers are as follows :—

Cattle	17,891
Horses	1,737

Monthly statement of cattle shipments is attached.

Veterinary Inspectors R. Riddell and A. Hobbs have done most of the inspection of cattle shipments during the past year. Veterinary Staff-Sergeant Nyblett and G. Jemison, V.S., were also employed in this work during a portion of the year.

I have the honour to be, sir,

Your obedient servant,

CHAS. H. McVEIGH,

Vet. Staff-Sergt.

The Officer Commanding,
R.N.W.M. Police, Calgary.

(C. H. H. SWEETAPPLE, V.S.)

FORT SASKATCHEWAN, October 31, 1904.

SIR,—I have the honour to request that you will forward to the Commissioner's office, Regina, the attached annual report of services performed for the Department of Agriculture for the year ended Ooctober 31, 1904.

I am pleased to be able to report that there is a marked decrease in the number of animals destroyed for glanders during the past year over the preceding twelve months and in the localities where this disease prevailed to a large extent for some time previous very few cases now appear.

Mange has been more prevalent than heretofore, but is entirely due to animals coming from the south which were previously affected. This disease has not gained any headway north of the Red Deer river. The settlers have made every effort to prevent the spread of the disease and have been most persistent in care and treatment of affected animals.

The inspection of all animals from the south now necessary, will no doubt prevent the further introduction of the disease and little difficulty will be experienced in overcoming the disease entirely in the district.

Swamp fever and typhoid influenza, which have prevailed to a considerable extent during the past few years have not been so prevalent, but still a number of settlers have suffered quite seriously.

Hoof disease or perhaps more properly cutaneous quittor, which has caused considerable trouble and loss in both horses and cattle during our very wet seasons has not proved serious the past summer and autumn.

A number of most peculiar and interesting cases are seen in such a large district and much more light is necessary in some of these diseases which appear to be peculiar to the North-west.

I must say that the great loss of horses especially, would be very much overcome if the settlers paid more attention to the sanitary condition of their outbuildings and more enlightenment is essential on this most important subject before many of the above diseases can be successfully treated.

I have the honour to be, sir,

Your obedient servant,

C. H. H. SWEETAPPLE,

Vet. Staff-Sergt.

The Officer Commanding,
R.N.W.M. Police, Fort Saskatchewan

(S. F. TOLMIE, V.S.)

VICTORIA, B.C., October 31, 1904.

SIR,—I have the honour to submit a report from April 1, when I was appointed an inspector in the veterinary branch of your department, to date.

Under directions from the Veterinary Director General, I commenced my official duties by making a thorough inspection of all the ports of entry for live stock on the boundary line between British Columbia and the States of Montana, Idaho and Washington.

Beginning at Victoria and Nanaimo, on Vancouver Island, I proceeded from there to Vancouver, New Westminster and Douglas, on the lower mainland; from there I went to Greenwood, Grand Forks and their sub-ports of Sidley, Midway, Carson and Cascade; from there to Nelson and Rossland and their sub-ports Waneta and Paterson; from there I went to Rykerts, on the Idaho line; then to Cranbrook and Elko, B.C.; and then to Gateway, on the Montana boundary.

I submitted a full report to the Veterinary Director General regarding the points visited, describing the conditions existing as I found them, with relation to their suitability for live stock ports of entry, condition of stock corrals, and the manner in which the work of the department was being carried out, and suggested certain changes which I considered would be conducive to the improvement of the service.

I also made a report on suitable sites for the erection of government quarantine corrals at the most suitable of the above points.

According to instructions from the Veterinary Director General, I made an inspection of the C.P.R. stock corrals at Revelstoke, B.C., and found them in an unsatisfactory condition. I interviewed the divisional superintendent of the C.P.R. at that point regarding them. I was informed by him that the company contemplated making an improvement in their accommodation for live stock at this point. Subsequently, on again looking into the matter, I found large and convenient corrals under construction.

I found the corrals at Nelson inadequate for the accommodation of large shipments of stock, and at Grand Forks no corrals at all. I interviewed the C.P.R. officials, drawing their attention to these conditions, since then the corral at Nelson has been enlarged and new yards erected at Grand Forks.

Hog cholera has caused some loss to swine breeders during the past summer. This disease has appeared in Victoria, Saanich, Oyster, Bright, Cranberry, Cedar, Mountain and Comox districts, on Vancouver Island, and in West Kootenay and Boundary districts on the mainland. As is usual in such outbreaks, a number of swine owners in the early stages showed a tendency to conceal the presence of the disease, with the result that several farms would be affected in a district before it was discovered by the inspector.

The disease was also spread in some districts by the practice prevailing of allowing the swine to run at large, these districts being heavily wooded made inspection a somewhat difficult matter.

However, I applied to the provincial government, informing them of the existing conditions, and requested them to strictly enforce their statute *re* hogs running at large. They responded very promptly and detailed a police officer to enforce the Act, with the result that the disease was soon got under control. Towards the end of the outbreak, when the farmers began to realize the serious nature of the disease, I found them more willing to report the appearance of it, and to take an active interest in its suppression.

I have reported heretofore on all cases of hog cholera dealt with by me.

Isolated cases of glanders have appeared in Victoria, Highland and Boundary districts. They were dealt with according to the regulations.

One small flock of sheep was quarantined for scab. I am informed that the disease was imported from Washington, U.S., before the present stringent inspection regulations for sheep were put into force.

I have tested two pure-bred shorthorn bulls with tuberculin for export to the United States, one reacted and was destroyed by the instructions of the owner, the other was suspicious and has been quarantined for three months and will be tested again at the expiration of that period.

Symptomatic anthrax appears occasionally in some districts. Tuberculosis and actinomycosis are encountered occasionally, being more prevalent in some districts than in others, they are dealt with by the provincial authorities.

Specific ophthalmia affected range and other cattle in the Okanagan valley during the summer months but subsided as the cooler fall weather approached.

In accordance with instruction from the Veterinary Director General I met him at Cranbrook, B.C., on September 21, and visited a number of the most important ports of entry for live stock on the boundary with a view to the selection of sites for the erection of government quarantine stations for live stock. The ground covered extended from Cranbrook to Victoria, B.C.

The contemplated plans for the erection of proper quarantine stations for live stock at certain points on the southern boundary of the province, and other suggested changes when carried out will place the health of animals branch of the department in this province in a much more satisfactory condition, and will greatly facilitate the work of the officers.

I have the honour to be, sir,
Your obedient servant,

S. F. TOLMIE,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(W. S. Bell, V.S.)

Cranbrook, October 31, 1904.

Sir,—I beg to submit the following report of inspection of live stock at the ports Gateway, Rykerts and Cranbrook and am pleased to say that I have had no outbreak of contagious disease of any kind in my district during the past year.

During the year 993 horses, 547 cattle, 4 mules, 39 swine passed the different ports in my district for inspection.

The new regulations requiring a certificate of health from the district from which range horses are being shipped from United States has had a good effect, also by excluding the poorer class of mares and stallions.

I have the honour to be, sir,
Your obedient servant,

W. S. BELL,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(SEYMOUR HADWEN, D.V.S.)

NELSON, October 31, 1904.

SIR,—I have the honour to submit to you my report from June 15 to October 31, 1904. During this period, there was an outbreak of hog cholera at Enterprise, Slocan Lake, which I attended to.

I also tested eleven cows imported for milk production, one of which reacted to the test.

The following list shows the number of animals inspected at this port and at Rossland.

Horses	404
Mules	2
Cattle	256
Sheep	3,670
Swine	71
Total	4,403

I have the honour to be, sir,
Your obedient servant,
SEYMOUR HADWEN,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(C. H. HENDERSON, D.V.S.)

GREENWOOD, B.C., October 31, 1904.

SIR,—I have the honour to submit this my report for the year ending October 31, 1904, at ports of Grand Forks and Midway.

During the year there was an outbreak of hog cholera at Greenwood and eighty-one hogs were destroyed.

One horse was tested for glanders on Anarchist Mountain and destroyed.

Eleven head of horses were refused entry at Midway, two being affected with glanders and the rest being in contact.

Following are the animals imported from April 1 to October 31, 1904 :—

Horses	712
Cattle	540
Sheep	13,040
Swine	64
Mules	9

I have the honour to be, sir,
Your obedient servant,
C. M. HENDERSON,
Inspector.

The Minister of Agriculture,
Ottawa.

(J. W. Bland, V.S.)

Vancouver, October 31, 1904.

Sir,—I have the honour to report that the general health of horses, cattle and sheep in the province of British Columbia during the past year has been good, with few exceptions.

On April 26 I inspected twenty-seven head of American Merino sheep for Clark Bros., of Addison, Vt., U.S.A., valued at twenty-five thousand dollars,—a magnificent flock indeed. Clark Bros. had five new wooden crates built here for their ocean voyage to Sydney, New South Wales. Clark Bros. and myself removing them from palace horse car number 58958, Canadian Pacific Railway Company, to new wooden crates with greatest possible care.

On April 28 I inspected thirty-four head of American Merino sheep for Bissell & Jackson, of East Shoreham, Vt., U.S.A., valued at thirty thousand dollars. Mr. Jackson had seven new wooden crates built here for their ocean voyage to Sydney, N.S.W. Mr. Jackson and myself removing them from palace horse car number 58958, Canadian Pacific Railway Company to new wooden crates with greatest possible care.

In conclusion I have again to thank the officers of His Majesty's Customs and also the Canadian Pacific Railway officers for assistance in fumigating cars from mange district.

I have the honour to be, sir,

Your obedient servant,

J. W. BLAND,

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

(C. R. Richards, M.D.C.)

Victoria, October 31, 1904.

Sir,—I beg to submit herewith my report of the work carried on during the year ending October 31, 1904.

There has been a total import inspection at this port of 221 horses, 1 mule, 98 cattle and 5 swine, since May 1, 1904, when inspection was placed on mutton sheep. I have inspected 14,046 sheep.

The exportations number, 8 horses and 1 sheep.

All animals inspected at the port of entry have been free from disease.

During the year I have been called to different parts of Vancouver Island to deal with outbreaks of hog cholera, the disease first being reported from the Comox district and is supposed to have originated in swine imported from the territories ; in all I have caused to be slaughtered 342 as being infected, and 59 as contact. No fresh cases have been reported for the last six weeks and I think the worst of it is now over, although for some time to come we may expect isolated outbreaks.

Considerable difficulty has been experienced in handling the disease in Chinese piggeries, which are usually kept in a very unsanitary condition. In not one instance have the Chinese reported the disease, although on investigation it was shown to have existed on their premises for some time.

In December, 1903, a case of glanders came under my notice in my private practice. I at once reported the case to Dr. Hopkins of Vancouver, B.C., who was then in charge of the work for British Columbia, and afterwards assisted him in testing the contact animals, two of which reacted and were quarantined, one passed the second test and the other was afterwards killed on showing clinical symptoms. I have since inspected and caused to be destroyed three horses infected with glanders and showing clinical symptoms, and tested with mallein two contact horses which showed no reaction.

I have the honour to be, sir,

Your obedient servant,

C. R. RICHARDS,

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

ACTINOBACILLOSIS.

(By Chas. H. Higgins, B.S., D.V.S.)

(*Pathologist.*)

The possibility of this disease existing in Canada was first mentioned by the Veterinary Director General of the Department of Agriculture, Dr. J. G. Rutherford, in his annual report for 1902.[1] The confirmation of this suspicion was made by the writer in an official report dated June 23, 1903, and since that time three other identified cases have been studied and have also furnished the data upon which this Bulletin is based.

The non-identification of this disease in the past has been due to the fact that little or no original work has been conducted in Canada, on the infectious diseases of animals, and when such work has been accomplished the greatest difficulties have been encountered.

This disease, as the name implies, bears a similarity to the disease known as 'Actinomycosis' or 'Lumpy Jaw'; and in fact a study of its anatomical manifestations and pathological lesions would lead the uninitiated to believe they were dealing with that classic affection. Until 1900-01, the two diseases were considered identical, in fact no effort had been made to differentiate between them until it was shown by Lignières and Spitz[2] that two distinct diseases were being treated under the one name, 'Actinomycosis.' Their work was exhaustive and indicated that beside the streptothrix causing the classic Actinomycosis, a bacillus, having none of the characteristics of a dichotomous strepthothrix was responsible for lesions exhibiting the same general character as are found in Actinomycosis, with the exception of their microchemical reactions, and, from its bacillary causative agent named it 'Actinobacillosis' (which means a ray-forming baccillus).

Nocard,[3] in 1902, identified this affecton in France, showing also that its distribution was general in that country.

The disease studied by us is identical with that studied by Lignières and Spitz in the Argentine Republic, and M. Nocard in France, with the exception that the bacillus isolated from our cases has not in any instance shown the degree of virulence credited to that isolated by the investigators mentioned, hence we may safely assume that in the cases studied, we have been dealing with an attenuated form of the disease.

The history and extent of this affection in Canada has not been fully ascertained, but it is more than probable that a number of the cases known under the name of Actinomycosis, would, if investigated, be found to be due to the peculiar bacillus which we are about to describe.

It is not our purpose at this time to discuss the subject of Actinomycosis, as this disease has received consideration by various writers and we are not prepared to add any new scientific data to that already published on this affection. It is, however, our intention to present in a clear and concise manner the results of our investigations upon this newly described disease, 'Actinobacillosis,' that Canadian veterin-

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[1] Annual report of the Minister of Agriculture, 1902, p. 82.

[2] J. Lignières and G. Spitz, de L'Institut National Bactériologie Buenos Aires, Actinobacillose, Recueil de Médecin Vétérinaire, 1903.

[3] Nocard, Actinobacillose der zunge, Jhar. der Vet. Med. Berlin, LVI., Bd., p. 695, 1903 (Abstract).

arians and stock-owners may know the essential characteristics of this disease which has been identified in Canada.

The history of the four cases identified by us is very brief and will be given in as full a manner as the data accompanying the material forwarded allows.

Case I.—An aged grade cow. Suffered considerably in fall of 1901 and spring of 1902. After being allowed to run to pasture for a time and delivered of her calf she seemed to make a good recovery. This year (1903) the symptoms returned in a more aggravated form and the animal was destroyed. The affected portion, consisting of the pharynx, larynx and the upper part of the trachea, including the œsophagus and tumour mass, was forwarded to the laboratory.

The material on arrival was looked upon as a tumour of non-infectious character and was immediately placed in a solution of formaldehyde until the pressure of routine would allow its examination, which was a few days later. On section the characteristic semi-fluid glue-like pus was revealed which is almost diagnostic. It was only at this time that the exact nature of the affection was suspected and this too late to obtain positive results from animal inoculation on account of the time the material had remained in the preserving fluid. Microscopic preparations of the pus revealed the peculiar clubs, and no portion of the smear preparation retained the colouring matter when treated by the method of Gram. Sections of the tumour cut in paraffine exhibited the same micro-chemical characteristics.

Case II.—This animal was a pure bred Shorthorn bull. He was examined by the local veterinarian in May. He has what was diagnosed as a small abscess in the left parotid gland. Potassium iodide was prescribed and continued for a long period, nevertheless, the abscess increased in size, the animal continued losing in flesh and breathed with some difficulty, due to the pressure on the larynx of the tumour mass. Later another abscess appeared on the hip near the tail. Owing to the condition of the animal and the progress the disease was making he was destroyed.

The material forwarded to the laboratory in this instance consisted of pus, taken at the time of opening the abscess in the region of the parotid gland. Laboratory animals (guinea-pigs and rabbits) were immediately inoculated. The first animal to succumb to the effects of the inoculation was a guinea-pig, death occurring on the nineteenth day after intra-peritoneal injection of the pus. At the autopsy this animal exhibited the characteristic lesions of the disease from which the bacillus was obtained in pure cultures.

Case III.—In this case the veterinarian was called to see the animal and owing to the extremely emaciated condition of the subject she was destroyed. It was noted that the tongue was not normal, in consequence of which it was removed and forwarded to the laboratory.

Arrving in a fresh condition, animal inoculations were made subcutaneously, the first succumbing to the effects of the disease at the end of twenty-six days. The lesions at the autopsy were characteristic of the disease, and the bacillus was obtained from them in pure culture.

Case IV.—A growth appeared on the jaw of an animal which was being fattened for beef. This growth was supposed to have resulted from the kick of a horse. A portion of the mass was forwarded to the laboratory for examination.

On microscopical examination the lesions of Actinobacillosis were found, there being no filaments and no portion of the material retained the colouring matter when treated by the method of Gram.

Lesions.—The gross lesions seen in an infected animal are very similar to those of Actinomycosis, consisting principally of a fibrous tissue hyperplasia. In many

instances the lesions can only be differentiated from those of Actinomycosis by their reaction to the various colouring matters used in preparing the material for microscopic examination, particularly to the method of Gram, decolourizing when treated with alcohol. The pus is characteristic, of a semi-solid consistency, glutinous, almost transparent and containing whitish granules which are scarcely visible to the naked eye. These granules when examined under the microscope exhibit 'bizarre' forms, which under high magnification show the peculiar bulb-like processes radiating from the mass. Owing to the glutinous nature of the pus it is with difficulty drawn into the ordinary laboratory pipettes, which must be of large calibre. If successfully drawn into them, greater difficulty is experienced in removing it in the process of making cover-slip perparations, cultures or animal inoculatons.

Cultural Characteristics.—Cultures are obtained direct from the pus with some difficulty, it being first necessary to crush the granular masses. It has been our practice to crush these particles against the side of the test-tube, using a heavy platinum wire for the purpose.

Morphology.—The bacillus causing Actinobacillosis resembles in a marked degree the bacillus of Fowl Cholera[4] studied by the writer in 1896. It is aerobic, facultative anaerobic, non-motile and in sizes varies, usually being from 1·0-1·8 μ long and 0·4-0·6 broad. A distinct polar arrangement of the protoplasm is noted in the hanging drop preparation. It stains with the ordinary aniline dyes, particularly those which are acidulated ; but does not retain the colouring matter when treated by the method of Gram.

Broth.—Culture in beef broth[5] show a slight colouring of the medium in twenty-four hours at 37°C. This cloudiness increases and after some days a slight sediment is noted. No scum has appeared on the surface of the medium. The addition of glycerine, up to five per cent, does not influence the growth.

Gelatin.—Only occasionally has it been possible to obtain any growth in gelatin, and even this has been very slight, appearing as very fine points, visible only on magnification. These points may appear deep in the medium, along the line of stab or near the surface. No liquifaction of this medium has been observed.

Agar.—Upon agar, small translucent colonies of one millimetre in diameter are noted at the end of twenty-four hours. The edges of these colonies are granular. In stab cultures growth is observed in the depth of the medium as well as on the surface. Colonies deep in the medium along the line of stab are finely granular and do not extend into the surrounding medium.

Gas Production.—No formation of gas has been noted in saccharose, glucose or lactose broth. There is a clouding of these media.

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[4] C. H. Higgins, Notes upon an Epidemic of Fowl Cholera, Jour. Expt. Med. Vol. III, No. 6, 1898.

[5] Preparation of broth :—

Leibig's extract of beef. . . .	5·
Sodium chloride.	10·
Witte's peptone.	5·
Distilled water.	1000·

This is boiled one hour, neutralized with potassium hydrate using phenolpthalein as an indicator and again boiled for thirty minutes and filtered. In neutralizing the medium is left slightly alkaline to compensate for the change which takes place in sterilizing in the autoclave. This broth was the basis of gelatine and agar media.

Milk.—Milk to which litmus and lactose have been added exhibits no change in reaction, nor is there a coagulation of the medium. This medium furnishes conditions favourable to the development of this organism.

Serum.—In liquid serum a floculent growth is observed in from twenty-four to forty-eight hours, which falls to the bottom of the tube. No general turbidity of this medium is observed.

Potato.—Upon alkaline potato a slight growth is noted after four days, appearing as small white colonies on the medium. Potatoes which are acid present no growth even after prolonged incubation.

Egg media.[6]—It was with egg media that the greater portion of our investigations with this disease were carried out, and it was the only medium used in the isolation of the bacillus. In the process of isolating the germ from the affected tissue of an experimental animal, the precautions noted by Theobald Smith for the isolation of the tubercle bacillus were observed. A portion of the tissue taken under such precautions was placed in the tube, partially crushed with a heavy platinum wire and smeared over the surface of the medium. A growth may appear in three days, but was in some instances not observed previous to eighteen days' incubation at 37°C. The first colonies appear as very small white dots raised from the surrounding medium, and in growing, form a mass which has the appearance of half a sphere, never attaining a diameter greater than two millimetres after prolonged incubation. If these first colonies are touched with the platinum wire, they are found to be rather hard and firmly adherent to the underlying medium, but if a smear preparation is made, the characteristic bacilli are found. If streaks on the medium are made from these first colonies, either in the same tube or transfers, observation after twenty-four hours reveals many small colonies, none exceeding one millimetre in diameter. After prolonged incubation the colonies grow very little larger, but become more numerous, gradually filling the intervening space, and finally form a white streak on the medium.

Indol.—A trace of indol is present in old broth cultures.

Agglutination.—Serum of experimental animals affected with Actinobacillosis causes a clumping of the bacilli in the hanging drop preparation, while that of other animals not infected causes no agglutination reaction.

Vitality.—The bacillus is destroyed in ten minutes at 62°C. Growths are obtained only at incubator temperature (37°C.), but may occasionally be obtained in a very slight degree at room temperature (20°C.). Tissue kept frozen for seven days, during which time the temperature ranged from —0° F. to —20° F., proved fatal to guinea-pigs on subcutaneous inoculation, in 25, 28 and 45 days respectively.

ANIMAL INOCULATIONS.

Guinea-Pigs.—Guinea-pigs inoculated intra-peritoneally with pure cultures or pus die in from nineteen to thirty-one days of a generalized actinobacillosis. We have been unable to produce death in a shorter period with a general peritonitis, which fact indicates, as already stated, that we are dealing with an attenuated virus.

The lesions presented at the autopsy are characteristic and very interesting, being entirely different from those observed, the result of other infective agents. Small pearly-white nodules appear just beneath the peritoneal and plural membranes, vary-

[6] M. Dorset. The use of Eggs as a Medium for the Cultivation of the Bacillus Tuberculosis. Annual report of the Bureau of Animal Industry, United States, 1901, p. 574.

ing from 1·0—5·0 mm. in diameter. The liver presents lesions throughout its substance, the surface being mottled. The spleen shows, usually, a varying number of nodules. The great mesenteric fold of the omentum has in every instance been the seat of extensive lesions, and in some cases has a thickness of one and one-half centimetres and a length of eight centimetres. The kidneys present nodules beneath their serous covering, but none have been observed in the substance of the organ. The diaphragm may contain numerous nodules beneath its serous surfaces. The stomach and intestines usually present nodules on their serous surfaces, varying from 1·0 mm. to 0:5 c.m. in diameter. Ulcers are usually present on the mucous surface of the stomach varying in size from 3·0 to 5·0 mm. in diameter. Ulcers were also noted in the intestine, particularly in the cæcum and large intestine. The lungs present greater or less involvement of their structure ; in some instances there being a few superficial nodules, while in others the lesions are general throughout the tissue of these organs. Serous fluid has been present in both the thoracic and abdominal cavities, but is not contantly found in either. Nodules have been observed on the surface of the heart and in the pericardial membrane. An excessive amount of fluid may or may not be present in the pericardial sac. No lesions of the endocardium have been observed. At the point where the needle enters the pertitioneal cavity there is always an extensive nodular manifestation in the abdominal wall beneath the peritoneum. The various lymph glands are usually enlarged, and present lesions.

Subcutaneous inoculation is usually followed by the same general lesions above mentioned. There is usually an abscess formed at the point of inoculation, and the lymph glands in the immediate neighbourhood are greatly enlarged. There may be no generalized infection where this method of inoculation is practised, death being due to toxic poisoning. This method of inoculation requires a somewhat longer period to result fatally, usually being from twenty-five to thirty-eight days.

Rabbits.—Rabbits, inoculated intra-peritoneally, present lesions very similar to those seen in guinea-pigs. There is a generalized actinobacillosis, in which the thoracic and abdominal viscera are involved to a greater or less extent. There is usually ulceration of the intestinal tract, more particularly of the cæcum and large intestine. in one instance this was very extensive. The serous membranes of the thoracic and abdominal cavities are extensively invilved. Inoculated intra-peritoneallly with either pure cultures or pus, rabbits die in from fifty-one to seventy days. In one instance one hundred cubic centimetres of fluid was contained in the abdominal cavity and in this fluid the characteristic tuft formation was demonstrated on microscopic examination.

We have not studied the virulence of this germ for other animals at this laboratory.

Microscopic examination.—The microscopic examination of the pus and tissues from animals affected with Actinobacillosis requires special technique to differentiate their various characteristics. The best results are obtained by the use of eosin and methylene-blue, and the method described by Lignières and Spitz[7] has given excellent

[7] Lignières and Spitz. Actinobacillose, Recueil de Médecin Vétérinaire, September 30th, 1902. Their Method is as follows :

Eosin, watery solution (Hoechst). . . 1 part
Borrel's Blue. . . . . 1 part
Water. . . . . 8 parts

Mix just before use and filter rapidly. Suspend sections attached to slides or coverslip preparations upside down over the staining dish and allow the stain to saturate them from below, thus avoiding the precipitate which is formed in the staining material. Stain in this solution for thirty minutes. Wash thoroughly in water. Use 10 per cent solution of tannic acid, which will cause colour of the section to brighten. Wash again in water. Dehydrate in alcohol. Clear with oil of caryophyllae and mountain xylol balsam. The stain, as above prepared, spoils within an hour and almost completely loses its staining qualities.

results with both the smear preparations from pus and paraffine sections of affected tissue. The methods of Gram and Wiegert also give good microscopic preparations. A saturated solution of eosin may be used, followed by Unna's alkaline methylene-blue. Good microscopic preparations of the pus may be obtained by the use of Romanowsky's stain as modified by Dutton and Todd.[8]

In fresh pus the tufts are not easily distingished, but when squeezed between the slide and coverglass are clearly visible, even to the naked eye. They are of a whitish-gray colour, and may be more easily examined if a little picro-carmine glycerine is placed at the edge of the coverslip, as the tufts stain yellow with picric acid and the rest of the field will assume a reddish tinge.

Lesions in the various organs and tissues exhibit the same general characters as are exhibited by the tufts in the pus. The peculiar bulb-like processes are seen to extend toward the surrounding tissue, similarly as is the case in actinomycosis. Immediately surrounding the mass of the lesion is an inflammatory area, its extent depending upon the nature of the lesion.

Infectiousness.—Actinobacillosis is an infectious disease, capable of communication by direct inoculation. We are not prepared at the present time to indicate the degree of danger through co-habitation, but from the nature of the infective agent we believe that this danger is perhaps slightly greater than is the case with actinomycosis. We have not found in any of the material indication of grains.

Treatment.—In this bulletin on the subject of Actinobacillosis it is fitting that something be said concerning the treatment of affected animals. We have conducted no experiments with this end in view, although we have such under consideration, but we have the results of other workers, who indicate treatment similar to that which is pursued in cases of actinomycosis, consisting principally in the administration of large doses of potassium iodide. This treatment, while beneficial, will have no ultimate results unless prescribed in the manifestation of the affection.

From the fact that in the majority of cases the lesions are located in the region of the larynx, and from the extensive tumour formation respiration is seriously interfered with, it is easily understood why the treatment must be commenced early. If the disease process has extended too far, the condition of the animal is such as to make treatment an unprofitable investment, for we have beside the actual lesions, the toxine poisoning to deal with.

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[8] Dutton and Todd. Trypanosomiasis Expedition to Senegambia, Liverpool School of Tropical Medicine, 1902, p. 3. Modification of Romanowsky's stain.

Solution A. Medicinal methylene blue (Hoechst)....	0·5	Grammes
Saturated solution of chemically pure borax....	0·5	c. c.
Incubate four days at 37° C., then add absolute alcohol....	50·	c. c.
Solution B. Eosin, Extra B.A. Crystals (Hoechst)....	25·0	Grammes
Distilled water....	50·	c. c.
Absolute alcohol....	50·0	c. c.

For use dilute with water, one part of stain to nineteen parts of water. Mix equal parts of diluted stain in a flask and pour immediately into a staining dish. Stain three to six minutes. Wash quickly but throughly in tap waper and try in the air without the aid of heat.

MANGE.

The term scabies or mange is applied to a class of skin disease produced by parasites of minute size belonging to the natural family *Sarcoptidæ*, which comprises three genera, the *Sarcoptes*, the *Psoroptes* and the *Symbiotes*.

Of the genus *Sarcoptes* there are several species, two only of which, however, affect mammals, viz., the *Sarcoptes* of scabies and the dwarf *Sarcoptes*. The latter are found on the heads of some small animals, such as the cat, rabbit, &c., and are not of great importance to stock-owners.

The *Sarcoptes* of scabies, on the other hand, comprise a large number of varieties, which live on man and many animals. This species, which is responsible for the most serious forms of parasitic skin diseases, is distinguished from other mange acari by the peculiar manner in which the female deposits her eggs, namely, in a burrow or gallery excavated for the purpose beneath the epidermis.

Of the genus *Psoroptes* there is but one species, although there are several varieties affecting different animals. It is this species of acarus which is responsible for the mange usually affecting both the cattle and horses of the western ranges. It must, however, be distinctly understood that a different variety infests each of the two species of animals mentioned, and that the malady is not transmissible from the horse to the ox or vice versa, although a slight temporary irritation of the skin may occasionally result from the transfer of the acarus.

All the mange insects are very minute, varying in length from 1-40 to 1-100 of an inch, the *Psoroptes* being slightly larger than the *Sarcoptes*, and consequently more easy of detection. The most certain mode of distinguishing true mange from other irritations of the skin, many of which closely resemble it in general characteristics, is, of course, the isolation of the acarus.

In the *Sarcoptic* form this is often difficult, as the parasites are usually deeply imbedded in the skin. The *Psoroptes*, however, can generally be detected by exposing to the sun's rays, preferably inside of a window, a quantity of the scabs and other debris scraped from the skin of the patient. After an hour or so of this exposure the movements of the acari, if present, can be detected with the aid of a good magnifying glass, although a low power microscope may be required to determine the exact variety to which they belong. It is needless to say that true mange is produced only by acari, and that it is impossible for the disease to originate in any way other than from contagion direct or indirect, although dirt, poverty and neglect undoubtedly favour its development.

The irritation of the skin is due, not to the bite nor to the movements of the parasite, but to a poisonous secretion or saliva which it introduces into the tissues, the most virulent being that peculiar to the *Psoroptes*.

The acarus once established on the skin of a congenial host, the symptoms of mange are not, as a rule, long in becoming apparent, although, for reasons not yet fully understood, the disease is usually much more active in the winter than during the summer season. This peculiarity has long been noted, and in Europe has been attributed to the warmth of winter stabling, but as the same condition is observable in animals constantly exposed to the weather, some other explanation is evidently required.

Mange, whether due to *Sarcoptes* or *Psoroptes*, gives rise to intense itching, accompanied by loss of hair, and later by effusion, thickening of the skin and the formation of scabs or crusts. Redness is also always present, although this cannot

be detected except in white or light coloured animals. As the disease advances the thickened skin, especially where loosely attached to the tissues, becomes corrugated in deep folds or ridges, this condition being very characteristic, in chronic cases. The progress of the disease, at first slow, soon becomes rapid, owing to the tremendous rate at which the parasites multiply. According to Gerlach, one pair of acari are capable of producing, through successive generations, within three months no less than 1,500,000 descendents. The period required for the eggs to hatch is short, varying from three to ten days, according to the favourable or unfavourable nature of the circumstances.

Sarcoptic scabies, although seldom seen in Canada, merits a brief description.

Of the larger animals, it affects the horse, ass and mule only, the ox being, so far as known, free from the attacks of this genus. The disease at first develops slowly, its specific lesions being seldom noticeable before the expiry of at least three weeks from the date of infection. It is generally first noticed in the region of the withers, whence it extends in an irregular manner over the surface of the body proper, the extremities usually being left untouched. If neglected it soon produces constitutional disturbance which, with the loss of rest and food due to the continual irritation, not unfrequently leads to a fatal termination. Cases of old standing are difficult to treat successfully, the disease frequently reappearing in animals apparently cured.

Except in the very early stages it is contagious in the extreme. Gerlach states that he has seen healthy horses become affected in fifteen minutes when placed alongside of mangy horses on which the disease had reached th scabby stage. The transmission is effected not through the eggs or the mature egg-laying females which are buried in the skin, but through the rapid movements of the younger individuals in both sexes. Many experiments have been conducted with the object of conveying *Sarcoptic* mange of the horse to animals of other species, and vice versa, but as a rule, without success, although a temporary irritation, disappearing spontaneously or yielding readily to treatment, may make its appearance. The irritation referred to is especially noticeable in man, and some authorities believe that the infection in this case is a real one, although actual proof to this effect is, so far, lacking.

Psoroptic mange of the horse, while not so intractable as that produced by the *Sarcoptes*, is still a very serious malady, capable, under favourable conditions, of causing great suffering to affected animals and corresponding loss to their owners.

It generally makes its appearance at or near the roots of the mane or tail, the first indication of infection being the rubbed or broken appearance of the long hairs of one or both of these appendages. Examination will reveal the presence of an eruption of small pimples containing fluid, which, on breaking, form a crust. This crust, as the exudation continues, becomes thicker, but remains moist, thus differing from that of *Sarcoptic* mange, which is dry and scaly. As the acari multiply, the disease gradually spreads from each centre of infection, and the irritation being greatly increased by constant rubbing, the skin eventually becomes thickened, inflamed and wrinkled, while the hair in many cases either falls out or is rubbed off.

Between the wrinkles is to be found a moist, filthy accumulation of broken scab, which, especially in warm weather, is offensive in smell, and contributes largely to the general skin irritation.

Psoroptic mange does not spread over the surface of the body as rapidly nor to as great an extent as the *Sarcoptic* form. Gerlach states, however, that the vitality of the *Psoroptes* when removed from the host, as for instance on blankets, brushes or harness, is greater than that of the *Sarcoptes*. They have been known to live for a fortnight in dry open air, and for twice that period in a stable. Many attempts have been made to transmit the disease from the horse to other domestic animals but without success.

Psoroptic mange of cattle presents few points of difference from that of the horse as described above, and, as already stated, is due to a very similar variety of the same species of acarus.

It is usually first noticed in the region surrounding the root of the tail, although it may also commence operations at the withers or on the neck. Its manifestations greatly resemble those observed in *Psoroptic* mange of the horse, and it has the same tendency to apparently recover in summer only to reappear with the return of the cold weather. It yields rapidly to treatment, and only becomes serious when neglected.

Symbiotic mange is, in horses generally confined to the legs, where it causes great irritation, and eventually loss of hair, thickening and inflammatory exudations. It is most frequently seen in heavy horses with hairy legs. It spreads very slowly, and yields readily to treatment.

Symbiotic mange of cattle is even less serious than in horses. It is seldom seen except at the root of the tail, and only extends to other regions when long neglected. It is very slightly contagious, and is amenable to simple treatment.

In animals properly domesticated the treatment of mange is comparatively simple.

Affected animals should be clipped, the place where the clipping is performed thoroughly disinfected, and the hair burned. The animal should then be well rubbed all over with soft soap, to which a small quantity of creolin or some similar agent may, with advantage, be added. This should be followed, after a lapse of several hours, by a thorough dressing with one or other of the preparations given below.

A very satisfactory and effective remedy consists of the following :—

Oil of tar	One part
Linseed oil	Twenty parts

to which should be added as much sublimed sulphur as the mixture will conveniently carry. These ingredients are to be heated gradually together, but must not be allowed to boil. This mixture should be well rubbed into the skin, and allowed to remain on for several days, when it may be washed off and the application repeated.

Another excellent remedy, which can be used in the same way, is known as Helmerich's Pomade, consisting of :—

Sublimed sulphur	200 parts
Potassium carbonate	100 "
Lard	800 "

Where oleaginous preparations are used, it is well not to cover the whole body at once, as the functions of the skin are liable to be suppressed, with dangerous results.

A most effective mixture consists of :—

Creosote	10 parts
Alcohol	10 "
Water	25 "

Or—

Creosote	1 part
Vegetable oil	30 parts

Zundel's Formula.

Crude carbolic acid	53 oz.
Quicklime	36 "
Carbonate of soda	107 "
Soft soap	107 "

Dissolve in 57 gallons of hot water.

Crude carbolic acid is preferred to the pure article, as the essential oils it contains are beneficial, but creolin can be substituted for either with good results.

Coal oil and benzine are excellent agents for the destruction of acari, but are apt to cause persistent irritation of the skin, which is difficult to distinguish from that due to the disease itself.

A useful kerosene emulsion, however, is the following :—

Hard soap	½ pound
Water	1 gallon
Kerosene	2 gallons

The water should be at boiling point when the other ingredients are added, and the mixture is to be constantly stirred until cool, when it may be dissolved in 60 gallons of hot water.

Where large quantities are required, as for dipping, any of the following preparations will be found suitable and convenient :

South African Official Mange Dip.

Flowers of sulphur	21 pounds
Unslaked lime	16¾ "
Water	100 gallons

The lime should be slaked so as to form a rather thick lime paste. The flowers of sulphur should then be added to this paste, and the whole well stirred. The mixture is then to be placed in a kettle with twenty-five or thirty gallons of boiling water, and boiled for two hours or more, during which time it should be stirred at intervals. After the sulphur disappears from the surface the mixture, including the sediment, may be poured into a barrel provided with a bung hole a few inches from the bottom. After being allowed to settle, the liquid is to be drained off through the spigot near the bottom of the barrel, and enough warm water added to make 100 gallons. The sediment is not to be used for dipping purposes, but can be utilized to advantage in the disinfection of fences, yards and buildings. All lime and sulphur dips are to be prepared in a similar manner.

Australian Dip.

Twenty-five pounds of sulphur and 18 pounds slaked lime, made into the consistency of thick cream.

By boiling the above for twenty minutes in 20 gallons of water, the sulphide and hyposulphite of calcium are produced. The resulting orange coloured liquid is finally mixed with sufficient water to make it up to 100 gallons.

Fort Collins Dip.

Flowers of sulphur	33 pounds
Unslaked lime	11 "
Water	100 gallons

A lime and sulphur dip recommended by the United States Bureau of Animal Industry is as follows :—

Flowers of sulphur	24 pounds
Unslaked lime	8 "
Water	100 gallons

As will be noted, the Australian dip is stronger than any of the other lime and sulphur dips mentioned above, and should therefore be used with some caution, as irritation, especially of the eyes, is liable to follow dipping in very strong preparations of this nature.

Recent experiments have shown that when the ingredients are mixed in the following proportions there is less waste of material than in any of the dips mentioned above, while the preparation is equally effective.

Flowers of sulphur	24 pounds
Unslaked lime	10 "
Water	100 gallons

This prescription is therefore recommended to Canadian stockmen, although any of the lime and sulphur compounds given above will, if properly prepared and used, be considered satisfactory to the department.

All applications will be found much more effective when used at a temperature as hot as can comfortably be borne, viz., from 100° to 110° Fahrenheit.

This is most essential, and many different methods of maintaining heat have been recommended. The department is now experimenting with a specially designed boiler, but as at present constructed, it is too clumsy and expensive for ordinary use.

In a bulletin recently published by Dr. Van Es, of the North Dakota Agricultural College and Government Experiment Station, a very simple and inexpensive mode of heating is described as follows :—

'The special heating apparatus spoken of consists of a pipe running alongside of the vat and communicating with it below and above. The pipe is provided with several elbows by means of which a straight piece is placed parallel to the vat, at some distance from it, in an open trench. In this trench a fire is maintained and the whole arrangement is so made that the pipe is well surrounded by the fire. As the pipe slightly inclines, the heated water escapes upward into the vat, while its place is taken by colder water entering the pipe from below. The water thus being kept in circulation, gradually reaches the required temperature. Instead of a single pipe, a coil of pipes may be used, by which arangement a greater surface is exposed to the heat of the fire and the required temperature can be obtained in a shorter space of time.

'The same fire may be made use of to prepare the dip by placing the tank in which this is to be boiled over the trench.'

By coiling the pipe and inclosing it in a galvanized iron box, the heat can be economized and a considerable saving of fuel affected.

Treatment, to ensure success, must be repeated after an interval of at least ten days.

Horses suffering from *Sarcoptic* mange frequently require three or four dressings.

In addition to treating affected animals, it is of course necessary to thoroughly cleanse and disinfect stables, yards and corrals in which they have been kept, as also all articles with which they have, in any way, been brought in contact.

Too much care cannot be exercised in dealing with any of the forms of disease produced by mange acari, as they are insidious to a degree, and frequently reappear after all danger is thought to be past.

J. G. RUTHERFORD,
Veterinary Director General.

OTTAWA, June, 1904.

DIPPING PLANTS.

The illustrated description of dipping plants which follows is reprinted, by permission, from Farmers Bulletin No. 152, of the United States Bureau of Animal Industry, its author being Richard W. Hickman, V.M.D., chief of the miscellaneous division.

Of the various dipping plants in use, there are but two kinds that need description—the small dipping plant, which is inexpensive and suitable for use by a community of farmers, and the larger dipping plant with swimming tank, such as would be needed if large numbers of range cattle are to be treated. A suitable plant for a community of farmers has been built for $150, while a swimming tank will cost $350.

Such a plant as that in operation 18 miles north of Steele, North Dakota, known as the Langedahl, would seem to be an admirable example of the smaller kind. This plant, with the exception of the tank, was built by farmers. A threshing engine was used for heating purposes by connecting a 1¼-inch pipe to the whistle intake, the whistle being removed, and the pipe joined to the union. The plant has a capacity of 200 head per day. Its cost, without engine or labour, excepting the labour to build the tank or vat, was $150. One person can easily lower the cage, when loaded by taking a hitch around a post, and it may be raised, as shown in illustrations, either with engine or horses.

MATERIALS FOR PLANT.

Following are the illustrations (figs. 1-15) and list of materials for the smaller plant, the tank of which may be filled with dip made as per preceding formula for about $7.50. The drawings from which the illustrations were made and list of materials were furnished by Dr. Robert H. Treacy:

Entrance pen and chute.

65 plank 2 inches x 6 inches x 16 feet.
28 posts.
18 braces 4 inches x 4 inches x 4 feet.

Tank or vat.

800 feet good 2-inch plank.
400 running feet tongue strip.
10 pieces 4 inches x 4 inches x 16 feet.
2 pieces 2 inches x 6 inches x 16 feet.
10 pounds lead.

Cage.

8 pieces 4 inches x 4 inches x 16 feet.
8 pieces 2 inches x 4 inches x 16 feet.
12 pieces 2 inches x 10 inches x 16 feet.
10 pieces 1 inch x 10 inches x 16 feet.
4 half-inch iron rods, with ring in each end, 5½ feet long.
2 half-inch iron rods, with ring in each end, 4 feet long.
3 pairs of heavy hinges.

Derrick.

2 pieces 6 inches x 6 inches x 20 feet.
1 piece 6 inches x 6 inches x 10 feet.
6 pieces 4 inches x 4 inches x 12 feet.

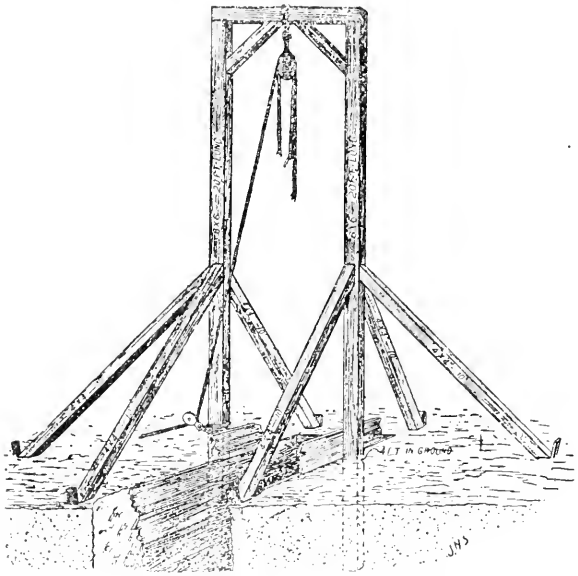

Fig. 1.—Derrick. Sixteen ft. high above ground. Derrick posts 4 ft. in ground, 6 by 6 by 20 ft. long. Braces 4 by 4 by 10 ft. long; 2 double-leaf 6 in. blocks at top of derrick, and 1-leaf 5-in. pulley at bottom of derrick; 100 ft. of 1-in. rope.

Drip Chute.

10 pieces 2 inches x 6 inches x 14 feet.
4 pieces 2 inches x 12 inches x 14 feet.
4 pieces 4 inches x 4 inches x 16 feet.
1 pair heavy hinges.
1 gallon tar.

Holding pen.

32 cedar or oak posts.
200 pounds wire.
5 pounds staples.

Hardware and incidentals.

100 pounds 20-penny spikes.
20 pounds 40-penny spikes.
2 6-inch double-leaf blocks.
1 5-inch single-leaf block.
100 feet 1-inch rope.
25 feet 1½-inch iron pipe.
1 galvanized-iron heating tank (5 barrels capacity).
4 oil barrels.

ADVANTAGES OF THE DIPPING PLANT.

A plant of this capacity will answer very well in a community where various owners have bunches of cattle ranging from 80 to 100 head or less. Among its chief advantages over the swimming tank are cheapness in construction, because of its size, and proportionately smaller expense in operating; the dip can be kept at the re-

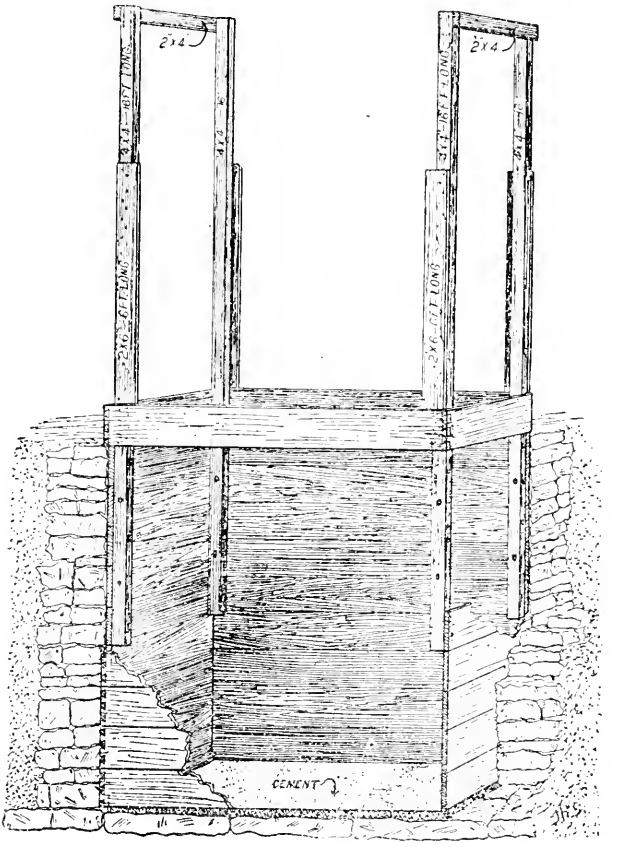

Fig. 2.—Vat. Tank 10 ft. deep, 4 ft. wide, 9 ft. in ground. Should contain from 5½ to 6 ft. of dip. Standards 4 by 4 by 16 ft. long, bolted to tank inside, to extend 6 ft. inside of tank, to act as guides to cage; 2 by 6 in. plank 6 ft. long nailed outside of standards; 2 by 4 or 2 by 6 in. braces across top of standards. The tank should be built of 2-in. plank and joined with a tongue, the ends of the tank mortised in, the joints coated with lead. The braces are 4 by 4. The tank, being placed in the ground and packed solid, does not require much bracing. The tank should be laid in cement bottom,wi th stone and mortar about sides .

quired temperature with facility, because of its lesser volume, and the submerging of the animals, as well as the length of time it is desired to keep them in the dip, can be more easily regulated.

In communities where mange does not exist, and where numbers of small herds are infested with lice, a plant of this character might be constructed and used with profit to the cattlemen. Many of the cattle were dipped during the past year because of having been exposed to mange, or scabies, by being herded with those

affected, showed much improvement in condition soon after dipping, as they were infested with lice to a considerable extent, although showing no distinct evidence of

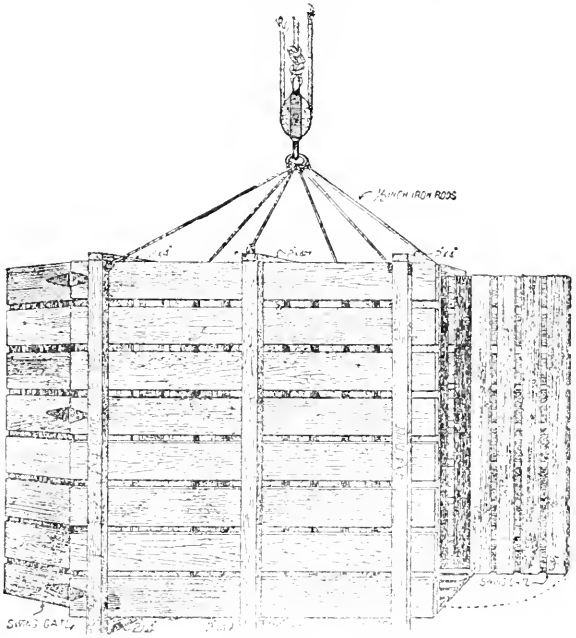

Fig. 3.—Cage. Eight ft. long, 8 ft. high, 2½ ft. wide—inside measurement ; 2-in. plank used for outside, boarded up and down inside with 1-in. boards to keep animals from climbing up sides. Plank 2 in. apart. Inside boards 2 in. apart, and 1-in. cracks in floor to allow free escape of dip fluid.

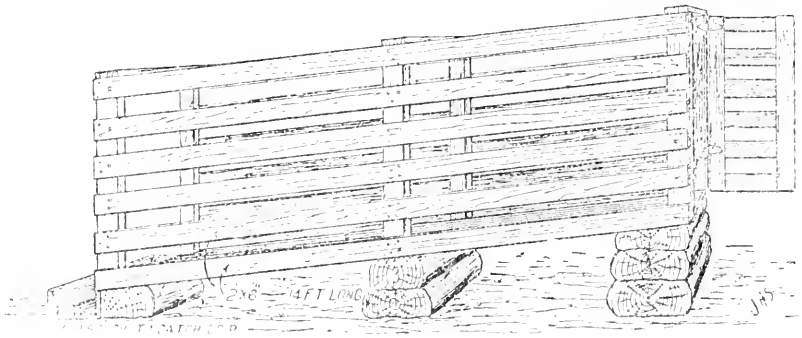

Fig. 4.—Drip shute. Fourteen ft. long ; 2 by 6-in. plank ; 5 ft. high. Set with 18-in. slope from front to rear. Trough at rear to catch drip, from which a pipe may be run to connect with tank to carry drip from drip chute back into tank. Floor of drip chute should be tight to prevent waste.

being affected with mange. It was observed that the lousy and mangy cattle stopped rubbing or digging after the first dip, and improved rapidly after being relieved of the torture that is inflicted by both of these troublesome parasites—scab mites and lice.

SPECIFICATIONS FOR LARGE DIPPING PLANT WITH SWIMMING TANK.

The following plans and specifications are for the construction of such a dipping plant as that of the Rice Lake Cattle Company, and are in accordance with the drawings made for that company after the following specifications, made by A. Van Horn:

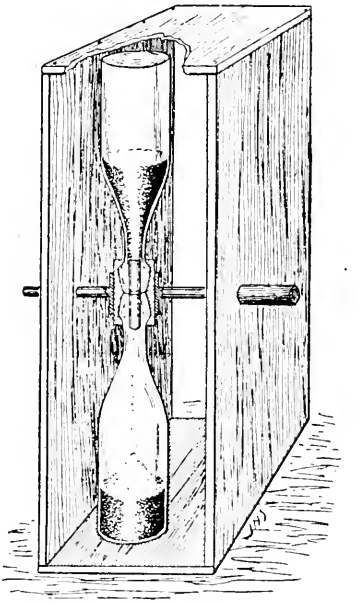

Fig. 5.—Sand glass. For timing the animals in the dip. Is made of two ordinary ketchup bottles, connected by a hollow wooden cork, placed in a box, and the box hung on a pin through the centre to revolve, as shown in the illustration.

LABOUR REQUIRED.

Excavations.—Excavate for the vat, as shown by the drawings, to the proper depth; level the bottom of the pit for the sills of the vat. After the vat is completed and the outside has been coated with coal tar, fill in around the vat, using the surplus earth to bank up and grade the sides of the vat above the natural grade, sloping the banks from the vat. Dig all holes required for the gate and fence posts.

Carpenter Work.—All work must be done in a skilful and workmanlike manner; the framework of the vat to be bolted and spiked together; the plank of sides, ends, and bottom of the vat and dripping floor to have edges bevelled for the calking as per detail, well driven together and well spiked with 20d. wire nails, using 40d. nails on the 3-inch plank. Calk all seams with oakum, well driven in with a calking iron and pitched. The exit, or inclined end, of the vat to have 3-inch bottom plank; all other plank of the vat and dripping floor to be 2 inches thick. Top of vat to be tied with 4 x 4-inch ties across top, framed and bolted to uprights as shown. Put 2 x 12-inch splashboards, on sides at top of vat, nailed to under side of the tie timbers and braced. The exit end of vat and dripping floor to be cleated with 1½ x 3 inch strips, well nailed to floor and bottom. Construct the trap at entrance—30 x 84

inches—of 2-inch plank, with 2 x 10-inch battens bolted together, top to be covered with 14-gauge sheet steel. Trap to swing on a 2-inch wrought-iron pipe or 2-inch

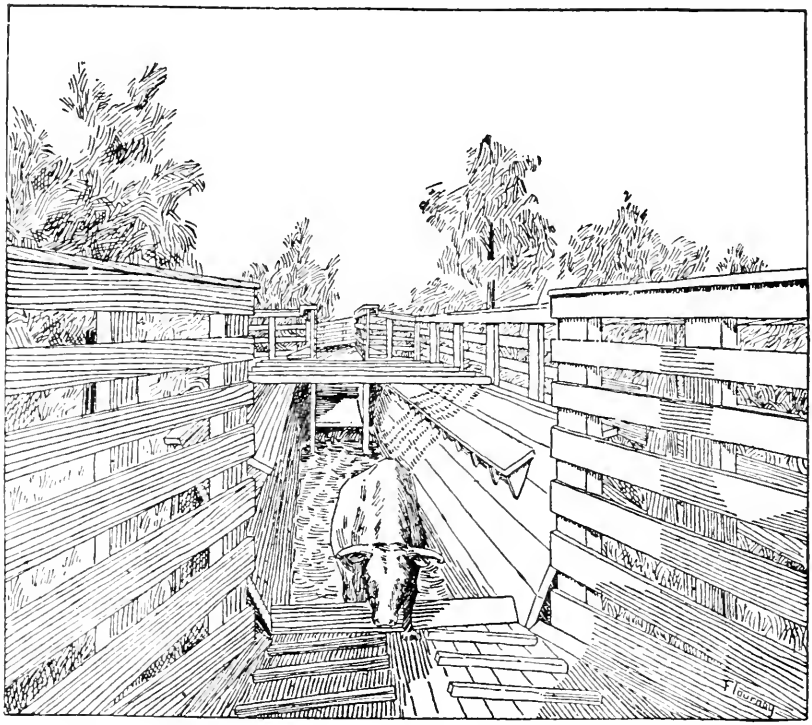

Fig. 6 Steer emerging from dipping vat, or swimming tank, of large plant.

steel bar seated in the end of vat, with ½ x 4 x 12-inch iron sockets bolted to vat. Secure the trap to the axle with iron straps bolted to underside of the centre battens. End of vat to have false back as shown.

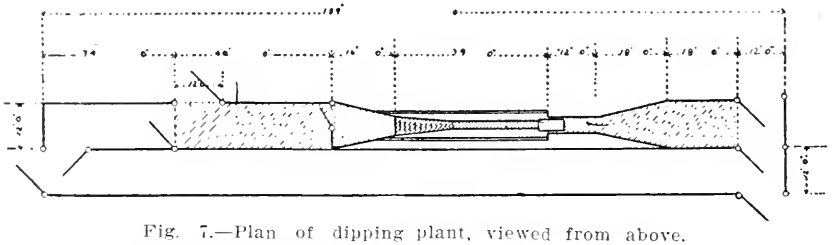

Fig. 7.—Plan of dipping plant, viewed from above.

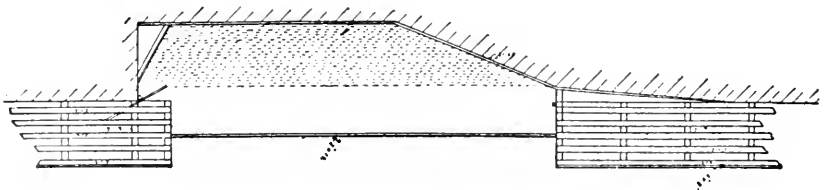

Fig. 8.—Vertical section of dipping vat, with older-style automatic trap on pivot. It will be seen that the incline at the bottom of the trap end of the vat is in a perpendicular line with the free end of the trap; where the spring trap is used, the length of the incline should be increased in order that at the bottom of the vat it may still be in line perpendicularly with the end of the trap when set; otherwise cattle are liable to get back under the trap, causing trouble.

Gates and fence.—Construct and erect the gates and fences as per drawings. The gate post to be set 4 feet in the ground and the fence posts 3 feet 6 inches. Set all

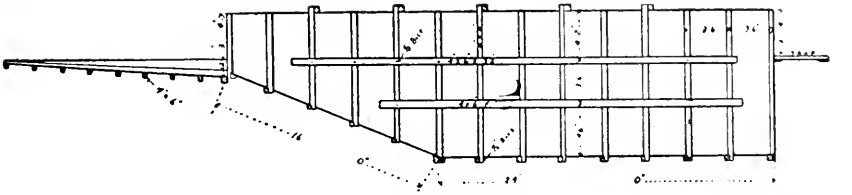

Fig. 9.—Side view of dipping vat, showing inclined egress and dripping floor.

posts plumb and to a line; well and thoroughly tamp the earth around the posts. The bottom of all posts to be coated with coal tar before being set. Gate posts to be

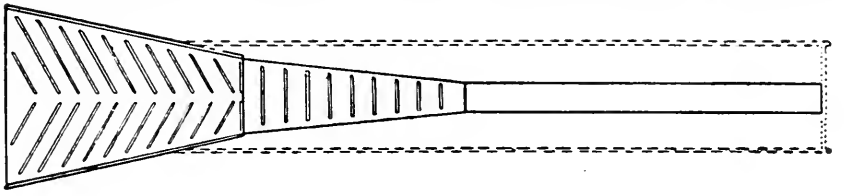

Fig. 10.—Swimming tank with incline and drip chute, looking from above.

8 x 8 inches, with 6 x 8-inch tie framed and driftbolted to the posts. Fence posts to be 6 x 6 inches. The gates to be bolted and spiked together and braced as shown.

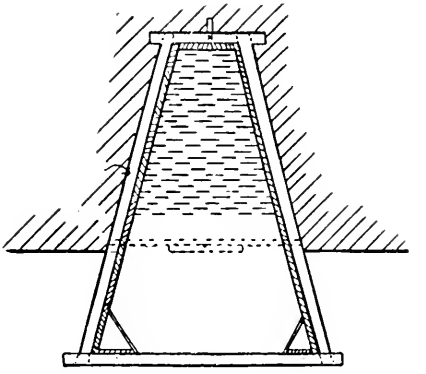

Fig. 11.—Vertical section of swimming vat, showing end of trap.

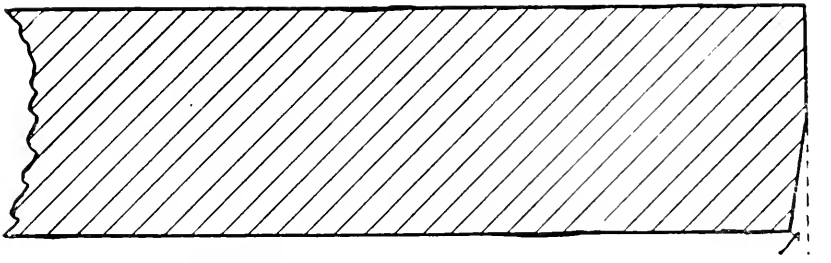

Fig. 12.—Plank showing bevelled edge for calking.

To be hung with ½ x 3 x 36-inch strap eye-and-bolt hinges. Bolt to run through posts and hinges bolted to gates. Gates to have ½ x 3 x 16-inch iron hasp bolted to gates and a suitable bolt staple, with iron pin and chain for locking.

Fence.—The fences to be five-railed, with cap, ribbon fence. Rails, or ribbons, to be of 2 x 6 inches, with 2 x 8-inch cap, spiked at each bearing with two 40d. wire nails. Posts to be set 8 feet on centres, or nearer, where distance may require.

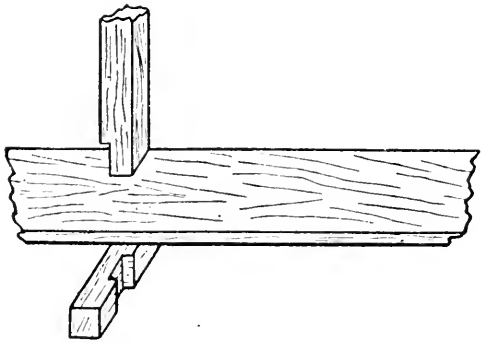

Fig. 13.—Sill and upright, showing method of joining.

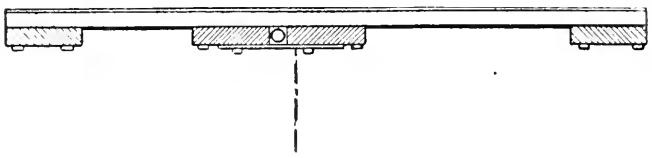

Fig. 14.—Vertical section of an older style of automatic trap, showing 2-in. iron pipe upon which trap is pivoted.

Lumber.—All lumber to be No. 1 pine or fir dimension, free from shakes, bark, large pitch pockets, unsound knots, or other imperfections that materially impair its strength, durability, and use for which it is intended.

Drainage.—The vat to have a 2-inch waste pipe fitted in the bottom with gate valve and elbow, and 20 feet of pipe to run horizontally under ground, with a fall of 2 feet on 16 feet. At this point the owner will take up the drainage without cost to the contractor, and continue the same to a suitable point either by pipe or open ditch.

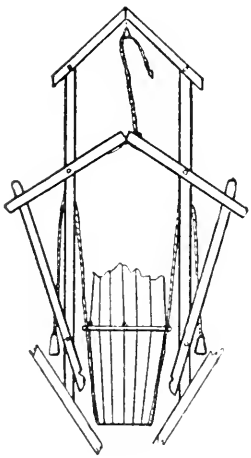

Figure 16.—Spring trap sprung. This trap is hung on an iron rod or on a 2-in. iron pipe; weights are attached at the free end to pull it back in place; it then sets automatically.

Dimensions of Vat.—Perpendicular depth of vat to be 10 feet; width at top, 7 feet; width at bottom, 2 feet; length of level bottom, 24 feet; horizontal length of sloping bottom, 15 feet; width of dripping floor at upper end, 12 feet; at lower end, 5 feet.

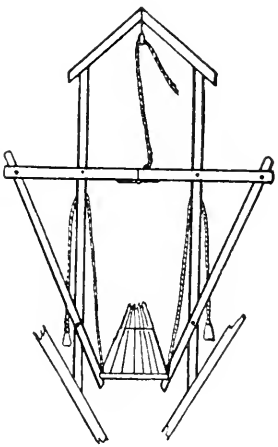

Figure 15.—Spring trap set.

Floors of Pens.—Should the owner decide to floor the catch pen and holding pen No. 1, the floor will be of 2-inch plank nailed to 4 x 4-inch joists or sleepers let into the ground and levelled. The sleeper to receive one coat of coal tar before being laid.

LUMBER BILL.

Vat and dripping floors.

Planks for sides, ends	1,080 feet	= 30 pcs.	2"	x 12"	x 18'	No. 1 pine or fir.
False back and bottom	576	24	2	12	12	"
	64	2	2	12	16	"
	96	2	2	12	24	"
		or 3			16	"
Sills, uprights, and ties	240	5	3	12	16	"
	72	2	3	12	12	"
	24	1	4	4	18	"
	32	2	4	4	14	"
	64	3	4	4	16	"
	32	2	4	4	12	"
	27	2	4	4	10	"
	64	2	4	6	16	"
	336	21	4	4	12	"
	96	4	4	4	18	"
	21	1	4	4	16	"
	19	1	4	4	14	"
Splash boards	160	4	2	12	20	"
Cleats	54	9	1½	3	16	"
Trap	23	1	2	10	14	"
	30	1	2	10	18	"
Total	3,115 feet.					

Gates.

Posts	896 feet	= 14 pcs.	8"	x 8"	x 12'	No. 1 pine or fir.
Tie beams	448	8	6	8	14	"
Ribbons	480	40	2	6	12	"
Braces	144	8	2	6	18	"
Battens or rails	96	6	2	6	12	"
	128	4	4	6	16	"
Total	2,192 feet.					

Fence.

Posts	2,010 feet	= 67 pcs.	6"	x 6"	x 10'	No. 1 pine or fir.
Ribbons	240	20	2	6	12	"
	140	10	2	6	14	"
	1,760	110	2	6	16	"
	450	25	2	6	18	"
Caps	64	4	2	8	12	"
	32	2	2	8	14	"
	469	22	2	8	16	"
	120	6	2	8	18	"
Total	5,285 feet.					

NOTE.—Oak or cedar posts are to be preferred. If round cedar posts are used, substitute 10-inch round posts for the 8 x 8-inch and 8-inch round posts for the 6 x 6-inch posts as above.

For catch pen.—There should be a plank floor in the catch and holding pen No. 1, but if only a limited number of cattle are to be dipped this may be omitted.

If it is decided to floor these pens the following material should be added to the foregoing lumber bill:—

For holding pen No. 1.	240 feet = 15 pcs. 4″ x 4″ x 12′ No. 1 pine or fir.	
	850 feet 2″ pine or fir plank, 12″ x 18′.	
	240 feet = 15 pcs. 4″ x 4″ x 12′ No. 1 pine or fir.	
	960 feet 2″ plank 16′.	
Total.		2,290 feet of additional lumber.

Cottonwood lumber may be used where the market price of same would make it practical.

SCHEDULE OF HARDWARE, &c.

Vat and dripping floor.

42 carriage bolts, ½″ x 6″, with washers.
40 carriage bolts, ½″ x 8″, with washers.
18 carriage bolts, ½″ x 4″, with washers.
40 lbs. 20d. common wire steel nails.
10 lbs. 30d. common wire steel nails.
15 lbs. 50d. common wire steel nails.
1 sheet No. 14 sheet steel 30″ x 84″, with 1 gross 1″ No. 10 screws.
20 lbs. oakum.
40 lbs. pitch.
10 gals. coal tar.
5 feet 2″ pipe or steel bar, for trap.
21 feet 2″ wrought-iron pipe, with couplings.
1 elbow, 2″.
1 flange for securing pipe to bottom of tank, 2″.
1 gate valve, 2″.

Gate and fence.

8 pairs eye-and-bolt hinges, heavy, ½″ x 3″ x 36″.
8 hasps, ½″ x 16″ x 3″, with bolt staple, for 8″ posts.
48 bolts, ½″ x 3″.
20 bolts, ½″ x 4½″.
68 bolts, ½″ x 6″.
160 bolts, ½″ x 4″.
32 driftbolts, ½″ x 12″.
20 lbs. 30d. common wire nails.
65 lbs. 40d. common wire nails.
16 gals. coal tar.

NOTE.—If catch and holding pen No. 1 is to be floored, add to the above 30 lbs. of 30d. wire nails and 5 gallons coal tar.

PRIVY COUNCIL, CANADA.

AT THE GOVERNMENT HOUSE AT OTTAWA,

THE 27TH DAY OF JUNE, 1904.

PRESENT:

THE GOVERNOR GENERAL IN COUNCIL.

Whereas by an Order in Council of the 4th day of March, 1904, regulations were established for the purpose of eradicating a disease in live stock in the Northwest Territories known as mange;

And whereas the Veterinary Director General reports that he deems it advisable that renewed active measures be taken with a view to preventing the possibility of the spread of this disease in other parts of the Dominion;

Therefore the Governor General in Council is pleased, in virtue of the provisions of section 29, of the Act 3, Edward VII, chapter 11, intituled 'An Act respecting Contagious or Infectious Diseases affecting Animals,' to order that the regulations established by the Order in Council of the 4th day of March, 1904, relating to mange in live stock in the Northwest Territories, shall be and the same are hereby rescinded, and the following regulations governing the whole Dominion substituted therefor:—

1. Every owner, breeder or importer of or dealer in animals, shall on perceiving the appearance of mange among the animals owned by him or under his special care, give immediate notice to the Minister of Agriculture and to the nearest Veterinary Inspector of the Department of Agriculture of the facts discovered by him as aforesaid.

2. Every veterinary surgeon practising in Canada shall immediately on ascertaining that an animal is affected with mange give similar notice to the Minister and to the nearest veterinary inspector.

3. In the Northwest Territories the notice required to be given by the two preceding sections of these regulations shall be deemed sufficient if given to the commissioner, assistant commissioner, or other officer of the Northwest mounted police force, or to one of the veterinary staff sergeants of the said force.

4. Every person having in his possession or keeping an animal affected with mange, shall forthwith cause such animal to be treated in a manner satisfactory to the nearest veterinary inspector or other duly authorized person.

5. No animal which is affected with or has been exposed to mange shall be permitted to run at large or to come in contact with any animal which is not so affected.

6. Any veterinary inspector or other duly authorized person may declare to be an infected place within the meaning of 'The Animal Contagious Diseases Act, 1903,' any common, field, stable, cowshed, or other place or premises, also any market, railway yard, stockyard, pen, wharf, railway car or other vehicle where the contagion of mange is known or suspected to exist.

7. Every veterinary inspector and every person duly authorized by a veterinary inspector shall have full power to order animals affected or suspected of being affected with mange to be collected for inspection, and when necessary, to be detained, isolated or treated in accordance with the instructions of the Veterinary Director General.

8. The expenses of and incidental to such collection, isolation and treatment shall be borne by the owners of the animals and if advanced by the inspector or other

authorized person shall, until paid, be a charge upon the said animals without prejudice, however, to the recovery of any penalty for the infringement of these regulations.

9. If such expenses are not paid within twenty days of the time when they have been incurred the inspector or other duly authorized person may proceed to sell the said animals by public auction after giving to the owner ten days notice in writing of such intention to sell, which notice may be effectually given, where the owner is known, by delivering the same to him personally or by sending it by mail addressed to him at his last known place of residence. Where the owner is unknown such notice may be effectually given by publication in one issue of a newspaper published or circulating in the district where such animals are detained. The proceeds of such sale shall be applied first in payment of the reasonable expenses of the collection, isolation, treatment, giving of notice and conduct of sale and the balance, if any, shall be paid to the owner of said animals on demand. Any balance not so paid shall be remitted to the Minister, and if not claimed within twelve months from the date of sale shall be paid to the credit of the Receiver General.

10. No animal shall be removed out of an infected place without a license signed by an inspector or other duly authorized person.

11. Every yard, stable, outhouse or other place or premises and every wagon, cart, carriage, car or other vehicle, and every vessel and every utensil or other thing infected with mange shall be thoroughly cleansed and disinfected by and at the expense of the owner or occupier in a manner satisfactory to a veterinary inspector or other duly authorized person.

12. The Veterinary Director General may from time to time order the slaughter or other disposition of animals which are affected with or have been exposed to mange.

13. Every person who violates any provision of these regulations and every person who refuses or neglects to carry out any order of an inspector or other duly authorized person shall, for every such offence, incur a penalty not exceeding two hundred dollars.

JOHN J. McGEE,
Clerk of the Privy Council.

DOMINION OF CANADA.

Order of the Minister of Agriculture relating to Mange.

Under and by virtue of the powers vested in me by the Animal Contagious Diseases Act, 1903—

(1.) I do hereby declare that the disease of mange exists among horses throughout that portion of the territories of Assiniboia and Alberta which is bounded and described as follows:—

Commencing at the source of the Red Deer river, in Alberta, thence following the centre line of the stream of the said river and the various windings thereof to a point where the said line intersects the fourth meridian, thence along the line of the fourth meridian southerly to the intersection thereof with the International boundary between Canada and the United States, thence westerly along the International boundary line to a point where the same intersects the western boundary of Alberta, thence northerly and along the western boundary of Alberta to a point therein due west of the point of beginning thence in a straight line to the source of the Red Deer river and the point of beginning.

(2.) I do hereby further declare that all horses which are now or shall hereafter come within the limits of the said tract shall be considered to have been exposed to the contagion of mange, and the said tract is declared to be an infected place within the meaning of the Animal Contagious Diseases Act, 1903.

(3.) And I do hereby order as follows: No horse, except as hereinafter provided shall be removed or allowed to more out of the said tract unless and until it has been examined by a veterinary inspector of the department and certified to be free from the contagion of mange.

(4.) All horses which are intended to be removed or to be allowed to move out of the hereinbefore described tract except as hereinafter provided, shall be inspected, and if necessary, detained, dipped, sprayed or otherwise treated at such point or points as the Veterinary Director General may designate and shall be accompanied by the certificate of an inspector stating that they are free from the contagion of mange.

(5.) Wherever mange is discovered among a band of horses intended to be moved out of the said tract, the affected animals shall be separated from those not visibly affected and shall be detained, segregated and treated to the satisfaction of the inspector until cured and free from the contagion of mange. Those not visibly affected with mange shall be dipped or otherwise treated to the satisfaction of the inspector, before being allowed to proceed to their destination.

(6.) No railway company shall accept or load any shipment of horses at any point within the said tract unless such shipment is accompanied by the certificate of an inspector as aforesaid.

(7.) At whatever point horses originating in the said tract are unloaded they must be placed in special yards, and such yards shall be cleansed and disinfected immediately after having been occupied by such horses.

(8.) All cars and other vehicles and the chutes, alleyways, pens, yards and corrals used during transportation of such horses and at points of destination shall be cleansed and disinfected to the satisfaction of an inspector.

(9.) All way bills and bills of lading accompanying shipments of horses originating within the said tract shall have plainly written or stamped across the face thereof, a notification that the said cars are to be cleansed and disinfected immediately after being unloaded.

(10.) The transit of horses through the said tract is hereby permitted subject to the following regulations:—

Horses for transit by rail through the said tract from one part of Canada to another shall at points where unloading is necessary be placed in yards reserved for their exclusive use, and shall not be permitted to come in contact with horses, which have originated within the said tract.

(11.) Horses imported from the United States into the said tract destined for points in Canada outside thereof may upon compliance with the quarantine regulations and with the provisions of the next preceding section hereof, be permitted to pass without unnecessary delay through the said tract direct to their destination, without further restrictions.

All persons engaged in breeding, importing, dealing in, driving or shipping horses, and all transportation companies, are requested to co-operate with this department in enforcing the provisions of this order.

GEO. F. O'HALLORAN,
Deputy Minister of Agriculture.

Dated at Ottawa, June 21, 1904.

DOMINION OF CANADA.

Order of the Minister of Agriculture relating to Cattle Mange.

Whereas the disease of mange exists among cattle throughout those portions of the territories of Assiniboia and Alberta which may be described as bounded by the International boundary, the Rocky Mountains and a line drawn as follows:—

The line between townships 32 and 33 from the Rocky Mountains as far east as the line of the Calgary and Edmonton Railway, thence north-easterly along the said line of railway to its intersection with the line between townships 36 and 37, thence east along that line to the line between ranges 24 and 25 west of the 4th principal meridian, thence north along that line to the line between townships 38 and 39, thence east along that line to the 4th principal meridian, thence south along the 4th principal meridian to the line between townships 28 and 29, thence east along that line to the line between ranges 7 and 8 west of the 3rd principal meridian, thence south along that line to the line between townships 10 and 11, thence east along that line to the line between ranges 20 and 21 west of the 2nd principal meridian, thence south along that line to the International boundary line.

Therefore under and by virtue of the powers vested in me by the Animal Contagious Diseases Act, 1903, I do hereby declare the said tract to be an infected place.

And whereas it is of the greatest importance to the interests of stock-owners and to the preservation of a profitable market for western cattle that immediate steps should be taken with a view to the eradication of the disease in question and the prevention of its spread throughout Canada.

And whereas it is deemed necessary for the purpose aforesaid to supplement the provisions of the Order in Council dated June 27, 1904, whereby it is in part provided as follows:—

'Every veterinary inspector, and every person duly authorized by a veterinary inspector shall have full power to order animals affected or suspected of being affected with mange to be collected for inspection, and when necessary, to be detained, isolated or treated in accordance with the instructions of the Veterinary Director General.

'The expenses of and incidental to such collection, isolation and treatment shall be borne by the owners of the animals and if advanced by the inspector or other authorized person shall, until paid, be a charge upon the said animals, without prejudice, however, to the recovery of any penalty for the infringement of these regulations.

'If such expenses are not paid within twenty days of the time when they have been incurred, the inspector or other duly authorized person may proceed to sell the said animals by public auction after giving to the owner ten days' notice in writing of such intention to sell, which notice may be effectively given, where the owner is known, by delivering the same to him personally or by sending it by mail addressed to him at his last known place of residence. Where the owner is unknown, such notice may be effectively given by publication in one issue of a newspaper published or circulating in the district where such animals are detained. The proceeds of such sale shall be applied first to payment of the reasonable expenses of the collection, isolation, treatment, giving of notice and conduct of sale, and the balance, if any, shall be paid to the owner of said animals on demand. Any balance not so paid shall be remitted to the Minister, and if not claimed within twelve months from the date of sale shall be paid to the credit of the Receiver General.'

And whereas, the nature of the disease and the conditions under which cattle are kept in the above described tract are such that treatment, to be successful must be

general and, as nearly as may be, simultaneous, and must include not only cattle actually diseased, but all cattle which may have been, directly or indirectly, exposed to contagion.

And whereas, after careful inquiry and due consideration, it has been decided that the period between September 1 and October 31 is the most suitable and convenient for such treatment:—

Therefore I do hereby notify all persons owning or being in charge of cattle within the above described tract that they must, during the said period, dip or otherwise treat such cattle in a manner satisfactory to the officers of this department.

Provided that where it can be clearly shown to the satisfaction of the said officers that the cattle in any well defined area or district within the said tract are not affected with and have not been in any way exposed to the contagion of mange or that they have, during the present season, been treated in a satisfactory manner and subsequently kept completely isolated from all other cattle, the facts shall be reported to the Veterinary Director General who may exempt such area or district from the operation of this order so far as it applies to treatment.

Treatment satisfactory to the department shall comprise either:—

(1.) Immersion for not less than two minutes in a solution of lime and sulphur of a strength of not less than 10 pounds of lime and 24 pounds of sulphur to 100 gallons of water prepared according to the directions of the officers of the department. Or

(2.) An application by hand of the following preparation:—

Sulphur	2 pounds.
Oil of tar	8 ounces.
Raw linseed oil	1 gallon.

In either case, the fluid used shall be applied at a temperature of not less than 100 nor more than 110 degrees Fahrenheit, and the treatment shall be repeated after an interval of not less than ten nor more than fifteen days.

The amount charged for the treatment of stray cattle or of cattle whose owners neglect or refuse to comply with this order so far as it refers to treatment, shall in no case exceed twenty-five cents per animal for each dipping or application, provided that where it is necessary to collect such animals and to hold them for the second dipping or application, an additional sum of one dollar per animal may be collected.

2. No cattle shall be removed or be allowed to move out of the hereinbefore described tract unless they are accompanied by the certificate of an inspector of this department stating they have been examined by him and found free from contagion of mange. Any such cattle, however, shall, if deemed advisable by the inspector, be detained, dipped, sprayed or otherwise treated in such a manner as the Veterinary Director General may, from time to time, prescribe.

3. No railway company shall accept or load any shipment of cattle at any point within the said tract except for immediate slaughter as provided in section 7, unless such shipment is accompanied by the certificate of an inspector as aforesaid.

4. At points where cattle originating in the said tract are unloaded they shall be placed in special yards, and such yards shall be used for no other purpose and shall be cleansed and disinfected when so ordered by an inspector.

5. All cars and other vehicles used for the carriage of such cattle shall be cleansed and disinfected to the satisfaction of an inspector as soon as possible, after being unloaded and before being used for any other shipment.

6. All way bills and bills of lading accompanying shipments of cattle originating within the said tract shall have plainly written or stamped across the face thereof a notification that the said cars are to be cleansed and disinfected immediately after being unloaded.

7. Cattle affected with or which have been exposed to the contagion of mange may be shipped for immediate slaughter to points within the above described tract under the following conditions:—

(1.) They shall be loaded from special yards and chutes reserved exclusively for such shipments; shall not be allowed to come in contact with other animals; shall be consigned direct only to such slaughter houses within the hereinbefore described tract as are provided with private yards and chutes; shall not be unloaded at any point en route and shall under no pretext whatever be removed alive from the slaughter house or the yards and premises immediately connected therewith.

(2.) Cars conveying such cattle shall be cleansed and disinfected to the satisfaction of an inspector immediately after being unloaded.

8. The transit of cattle through the said tract is hereby permitted subject to the following regulations:—

(1.) Cattle for transit by rail through the said tract from one part of Canada to another shall, at points where unloading is necessary, be placed in yards reserved for their exclusive use, and shall not be permitted to come in contact with cattle which have originated within the said tract.

(2.) Cattle imported from the United States into the said tract destined for points in Canada outside thereof may, upon compliance with the quarantine regulations, and with the provisions of the next preceding section thereof, be permitted to pass without unnecessary delay through the said tract direct to their destination without further restrictions.

All persons engaged in breeding, exporting, dealing in, driving or shipping cattle and all transportation companies are requested to co-operate with this department in enforcing the provisions of this order.

GEO. F. O'HALLORAN,
Deputy Minister of Agriculture.

Dated at Ottawa, August 9, 1904.

DOMINION OF CANADA.

REGULATIONS RELATING TO GLANDERS.

By Order in Council dated September 19, 1904, in Virtue of 'The Animal Contagious Diseases Act, 1903.'

1. Every owner, breeder or importer of or dealer in animals shall on perceiving the appearance of glanders among the horses, mules and asses owned by him or under his special care, give immediate notice to the Minister of Agriculture and to the nearest veterinary inspector of the Department of Agriculture of the facts discovered by him as aforesaid.

2. Every veterinary surgeon practising in Canada shall, immediately on ascertaining or suspecting that an animal is affected with glanders, give similar notice to the Minister and to the nearest veterinary inspector.

3. In the Northwest Territories the notice required to be given by the two preceding sections of these regulations shall be deemed sufficient if given to the Commissioner, Assistant Commissioner, or other officer of the Royal Northwest Mounted Police, or to one of the veterinary staff sergeants of the said force.

4. Horses, mules and asses showing at any time whatever clinical symptoms of glanders, shall on an order signed by a duly appointed inspector of the Department of Agriculture be forthwith slaughtered and the carcases disposed of as in such order prescribed.

5. No animal which is affected with or has been exposed to glanders shall be permitted to run at large or to come in contact with any animal which is not so affected.

6. Any veterinary inspector or other duly authorized person may declare to be an infected place within the meaning of 'The Animal Contagious Diseases Act, 1903,' any common, field, stable, cowshed, or other place or premises where the contagion of glanders is known or suspected to exist.

7. No horse, mule or ass shall be removed out of an infected place without a license signed by an inspector or other duly authorized person.

8. Veterinary inspectors are hereby authorized to inspect and to subject to the mallein test any horses, mules and asses affected with glanders or suspected of being so affected or which have been in contact with animals so affected or suspected of being so affected, or which have been in any way whatsoever exposed to the contagion or infection of the disease of glanders, and for the purpose of making such inspection or test to order any such animals to be collected, detained and isolated.

9. Inspectors are hereby authorized to order the slaughter of horses, mules, and asses which react to the mallein test, but do not show clinical symptoms of glanders and to order the disposition of the carcases of such animals, and the Minister of Agriculture is hereby authorized to order compensation to be paid to the owners of such animals at the rate set forth in subsection 2 of section 12 of 'The Animal Contagious Diseases Act, 1903,' as amended by chapter 6 of the Statutes of 1904.

10. Inspectors are hereby further authorized, should the owners prefer it, to order that horses, mules and asses which react to the mallein test but do not show clinical symptoms of glanders, be isolated and subjected to a second and third test with mallein, such second and third tests to be made at the expense of the owner, and to be completed within four months of the first test. Provided, however, that any animal which shows clinical symptoms of glanders at any time during the period between the first and third tests shall be slaughtered without compensation.

11. Horses, mules and asses reacting to the third test with mallein, shall be forthwith slaughtered on an order signed by an inspector and the carcases disposed of as ordered and the Minister may order compensation at the rate aforesaid to be paid to the owners for any of the said animals which have at no time shown clinical symptoms of glanders.

12. Inspectors are hereby authorized to permit owners of horses, mules and asses which give no reaction to the third test with mallein, and which have at no time shown any clinical symptoms of glanders, to retain and use such animals subject to the conditions contained in the order or notice signed by the inspector.

13. Before ordering compensation to be paid in any of the cases aforesaid the Minister shall require the production of a satisfactory report, order for slaughter, certificate of valuation and slaughter, and certificate of cleansing and disinfection, all signed by an inspector.

14. The certificate of an inspector to the effect that an animal has reacted to the mallein test or has shown clinical symptoms of glanders shall, for the purposes of the said Act and of this Order, be prima facie evidence in all courts of justice and elsewhere of the matter certified.

15. Every yard, stable, outhouse or other place or premises and every wagon, cart, carriage, car or other vehicle, and every utensil or other thing infected with glanders, shall be thoroughly cleansed and disinfected by and at the expense of the owner or occupier in a manner satisfactory to a veterinary inspector or other duly authorized person.

J. G. RUTHERFORD,
Veterinary Director General.

Department of Agriculture,
Ottawa.

CANADIAN REGULATIONS RELATING TO ANIMALS' QUARANTINE.

ORDER IN COUNCIL CONTAINING REGULATIONS RELATING TO ANIMALS' QUARANTINE.

AT THE GOVERNMENT HOUSE AT OTTAWA.

The 30th day of March, 1904.

PRESENT:

HIS EXCELLENCY THE GOVERNOR GENERAL IN COUNCIL.

Whereas it is deemed desirable and necessary that the present Cattle Quarantine Regulations should be amended owing to the repealing of Chapter 69 of the Revised Statutes of Canada, and Chapter 13 of the Statutes of 1896.

Therefore, the Governor General in Council, in virtue of the provisions of Chapter 11, of 3 Edward VII, intituled 'An Act respecting Infectious or Contagious Diseases affecting Animals,' is pleased to order that the Order in Council dated 25th January, 1897, establishing regulations relating to Animals' Quarantine and Health of Animals, shall be and the same is hereby rescinded and the annexed regulations substituted therefor.

(Signed) JOHN J. McGEE,
Clerk of the Privy Council.

The Honourable
The Minister of Agriculture.

HEALTH OF ANIMALS BRANCH.

QUARANTINE REGULATIONS.

Interpretation.

Sec. 1. In these Regulations, unless the context otherwise requires:—

(a) The expression 'the Minister' means the Minister of Agriculture:

(b) The expression 'inspection' means an inspection made by a duly authorized Veterinary Inspector of the Department of Agriculture;

(c) The expression 'contagious' means communicable by close contact or inoculation;

(d) The expression 'infectious' means communicable in any manner;

(e) The expression 'infectious or contagious disease' includes, in addition to other diseases generally so designated, glanders, farcy, pleuro-pneumonia contagiosa, foot and mouth disease, rinderpest, anthrax, Texas fever, hog cholera, swine plague, mange, scab, rabies, tuberculosis, actinomycosis and variola ovina.

Sec. 2. The Veterinary Director General is in charge of the Health of Animals Branch of the Department of Agriculture.

Sec. 3. The following Customs ports are hereby declared to be Animals' Quarantine Stations and all animals imported into Canada subject to quarantine must be entered through said Stations, viz.:—Halifax, N.S., St. John, N.B., Charlottetown, P.E.I., Quebec, Sherbrooke and St. Johns, Que., Niagara Falls, Windsor and Sarnia, Ont., Emerson, Man., North Portal, Wood Mountain, Pendant d'Oreille, Coutts and Cardston, N.W.T., Gateway, Rossland, Nelson, Grand Forks, Vancouver, and Victoria, B.C.

Sec. 4. Animals subject to inspection only, but which are not subject to quarantine, may enter through the aforesaid and at the following ports:—Pictou, North Sydney and Yarmouth, N.S., St. Stephens, Woodstock and McAdam Junction, N.B., Comin's Mills, Lake Megantic, Coaticook, Stanstead Junction, Mansonville, Abercorn, St. Armand, Rouse's Point, Athelstan and Dundee, Que., Cornwall, Prescott, Brockville, Toronto, Bridgeburg, Sault Ste. Marie and Port Arthur, Ont., Gretna, Morden, Mowbray, Crystal City, Killarney, Déloraine, Melita and Winnipeg, Man., Rykerts, Waneta, Midway, Sidley, Sumas, New Westminster, Douglas and Nanaimo, B.C.

IMPORTATION.

Sec. 5. (*a*) Persons contemplating the importation of animals from any part of the world, except the United States, must first obtain from the Minister a permit stating the number and kind of animals to be imported, the country of origin and probable date of shipment, the port at which said animals are to be landed and the approximate date of their arrival, and such permit shall not be available at any port other than the one mentioned therein.

(*b*) Application for such permits shall be in writing and the statements in such applications may be required to be verified on oath and the Minister shall decide in every case, whether a permit will be granted.

(*c*) Animals from countries other than the United States arriving at any port in Canada without such permit shall not be admitted to Canada unless and until ordered by the Minister.

Sec. 6. The importation into Canada of animals from all countries, other than the United States and Mexico, is prohibited except at the ports of Victoria, Vancouver, Quebec, Halifax, St. John, N.B., Charlottetown, P.E.I., and such other ports as may hereafter be indicated by the Minister.

Sec. 7. Persons in charge of vessels conveying animals to Canada must, immediately on arrival in port, notify the Superintendent of the Animals' Quarantine Station of the arrival of such vessel and the number and kind of animals on board thereof.

Sec. 8. All importers must certify under oath, before making customs entry, the place of origin of the animals imported by them.

Sec. 9. All animals arriving in Canada through any of the above mentioned ports on the Canadian sea-board shall be subject to inspection on arrival by inspectors who may, from time to time, be appointed for that purpose.

Sec. 10. All inspections of imported animals must be made in daylight.

Sec. 11. Inspectors shall have free access to any wharf, vessel, car, or to any place where animals may be found, and, under authority from the Minister, shall deal with animals, vehicles and other articles in the manner contemplated by the Animal Contagious Diseases Act, 1903.

Sec. 12. Inspectors shall visit the vessels or cars conveying animals into the said ports, and after inspecting such animals and finding them free from disease, shall superintend their landing or unloading, order them to be placed and disposed of according to the requirements of the case, and see that those to be quarantined are conveyed to the proper quarantine station. Inspectors shall also superintend the landing, unloading and disposal of fodder, litter, blankets, troughs and other articles which may have been used by or for the said animals.

Sec. 13. Inspectors may, if they deem it necessary, order the cleansing and purifying of any vessel, place, vehicle, building or article, and direct such precautionary measures to be taken as they may consider advisable pending the decision of the Minister as to the ultimate disposal of such vessel, place, vehicle, building or article.

CATTLE.

Sec. 14. (*a*) A quarantine of sixty days shall be enforced upon all cattle imported from Great Britain, Ireland or the Channel Islands. A quarantine of ninety days shall be enforced upon all cattle imported from all other countries except the United States and Mexico.

(*b*) The period of quarantine enforced upon cattle shall be counted from the date of clearance of the vessel carrying the same.

Sec. 15. All importers or their agents, before embarking animals, other than horses, for Canada, must obtain a certificate from a properly constituted authority that the place from which such animals come is free from pleuro-pneumonia contagiosa, rinderpest or foot and mouth disease.

OTHER RUMINANTS.

Sec. 16. A quarantine of fifteen days to be reckoned from the day of landing, shall be enforced upon all sheep and goats imported from countries other than the United States.

SWINE.

Sec. 17. A quarantine of fifteen days to be reckoned from the day of landing, shall be enforced upon all swine imported, except from the United States, for immediate slaughter.

Sec. 18. The minister may prohibit the importation of animals, other than horses, from any country or any district therein where he has reason to believe that pleuro-pneumonia contagiosa, rinderpest or foot and mouth disease exist.

HORSES.

Sec. 19. Horses imported from countries other than the United States, consigned to Montreal, must be, if the Minister so directs, inspected at the port of Quebec during summer navigation; in absence of special direction of the Minister, they may be inspected at the port of Montreal. Horses landing at any of the other ports named shall be inspected at such ports.

Sec. 20. Horses imported from countries other than the United States must be accompanied by the certificate of a qualified veterinarian and of the local authority of the district whence they came that no glanders, 'maladie du coït,' or other serious infectious or contagious disease has existed in said district for a period of six months prior to their shipment.

Sec. 21. Importers of horses will be required to certify under oath that the certificate produced applies to the horse or horses which it purports to describe and to no other, and that the district named is the actual one from which said horse or horses came. Any attempt at evasion or misrepresentation will be deemed a breach of these regulations and in addition will render the shipment liable to seizure and detention pending the orders of the Minister as to its disposal.

REGULATIONS OF QUARANTINE.

Sec. 22. Quarantine stations shall be under the care and subject to the orders of the officers appointed for that purpose hereinafter referred to as superintendents, who shall have the general superintendence and control of the servants or other persons, and of all other matters connected therewith.

Sec. 23. Animals in any quarantine station shall be treated and dealt with under the direction of the superintendent of said station, and all articles used for, about or in connection with the said animals shall be in like manner subject to his direction and supervision.

Sec. 24. Cattle six months old or over imported from countries other than the United States and Mexico shall not be discharged from quarantine until they have been submitted to the tuberculin test by the superintendent of the quarantine or other duly authorized officer.

Sec. 25. Cattle reacting to the tuberculin test, but not showing clinical symptoms, shall be permanently marked in the right ear with the letter 'T' by the officer making the test, and may then be released at the expiry of the prescribed period of quarantine if found free from all other infectious or contagious diseases.

Sec. 26. Cattle showing clinical symptoms of tuberculosis shall be destroyed or otherwise disposed of as the Minister may direct.

Sec. 27. The Minister or the Veterinary Director General may authorize the destruction of any quarantined animals or all or any portion of the articles used in the care of the said animals, and such destruction shall take place under the supervision of the superintendent, and in the manner prescribed by him.

Sec. 28. The expense of feeding, treating and providing for animals detained in quarantine, with the exception of those for the use of grounds and shelters, shall be borne by the owner or importer, and such expenses shall be paid before the animals are permitted to leave the quarantine, and in default of such payment within fourteen days after the expiration of the period of quarantine, the Superintendent may, on fourteen days' notice in writing, delivered or sent by mail to the owner or importer, cause the said animals to be sold to meet the said expenses, together with the expenses of and incidental to the sale of the said animals, the balance, if any to be handed over to the owner.

Sec. 29. No animal under quarantine shall be allowed to come in contact with any Canadian animal until duly discharged from quarantine.

Sec. 30. No animal under quarantine shall be removed from a quarantine station until duly discharged therefrom by the superintendent or other duly authorized officers.

Sec. 31. Any person removing or attempting to remove any animal from a quarantine station without the authority of the Superintendent, or other duly authorized officer, shall incur a penalty not exceeding $200 for every such offence.

IMPORTATION OF ANIMALS FROM THE UNITED STATES.

Sec. 32. All animals imported into the Dominion of Canada from the United States must be accompanied by a statutory declaration or affidavit made by the owner or importer stating clearly the purpose for which said animals are imported, viz:—whether for breeding purposes, for milk production, for work, for grazing, feeding or slaughter, or whether they form part of settlers' effects, or whether they are entered for temporary stay, as provided by these regulations.

Sec. 33. Said declaration or affidavit must be presented to the Collector of Customs at the port of entry, who will decide whether the animals are entitled to entry under these regulations, and who will notify the Veterinary Inspector of the Department of Agriculture in all classes where the regulations require an inspection to be made.

HORSES, MULES AND ASSES.

Sec. 34. Unless otherwise ordered by the Minister, horses, mules and asses may be admitted at any Customs port.

Sec. 35. The Minister may from time to time, order that any horses, mules or asses may be admitted at such points only as the order may designate and subject to such regulations as to inspection, detention, quarantine, submission to the mallein test, dipping or other treatment as the order may provide.

Sec. 36. Horses, mules and asses found to be diseased may be returned to the United States or otherwise dealt with as the Veterinary Director General may order.

CATTLE.

Sec. 37. All cattle shall be inspected and should, when possible, be accompanied by a certificate signed by a veterinarian of the United States Bureau of Animal Industry or by a State Veterinarian, stating that no contagious disease of cattle (excepting tuberculosis and actinomycosis) has existed in the district whence they have come, during the period of six months immediately preceding the date of their removal therefrom.

Sec. 38. Any cattle may be detained, isolated, submitted to the tuberculin test, dipped or otherwise treated, if so ordered by the Minister, or, in default of such order, where the inspector has reason to believe or suspect that animals are affected with or have been exposed to contagious or infectious disease.

Sec. 39. Cattle found to be diseased may be returned to the United States or otherwise dealt with as the Veterinary Director General may order.

Sec. 40. Cattle for breeding purposes and milk production six months old or over, if unaccompanied by a satisfactory tuberculin test chart signed by a veterinarian of the United States Bureau of Animal Industry, must be detained in quarantine for one week or such further period as may be deemed necessary and subjected to the tuberculin test; cattle reacting thereto must be returned to the United States or slaughtered without compensation.

Sec. 41. Importers may be required to furnish a statutory declaration that the chart produced applies to the cattle it purports to describe and no other.

SHEEP.

Sec. 42. All sheep shall be inspected, and should, when possible, be accompanied by a certificate signed by a veterinarian of the United State Bureau of Animal Industry, or by a state veterinarian, stating that no contagious disease of sheep has existed in the district whence they have come, during the period of six months immediately preceding the date of their removal therefrom.

Sec. 43. Any sheep may be detained, isolated, dipped or otherwise treated, if so ordered by the Minister, or, in default of such order, where the inspector has reason to believe or suspect that the animals are affected with or have been exposed to contagious or infectious diseases.

Sec. 44. Sheep found to be diseased may be returned to the United States or otherwise dealt with as the Veterinary Director General may order.

The above regulations, sections 42 to 44 are also applicable to goats.

SWINE.

Sec. 45. All swine shall be inspected and on and after May 1, 1904, a quarantine of fifteen days shall be enforced upon all swine except those imported for immediate slaughter.

Sec. 46. All swine imported into Canada, except for slaughter, must be accompanied by a certificate signed by a veterinarian of the United States Bureau of Animal Industry, or by a duly authorized state veterinarian, stating that neither swine plague nor hog cholera has existed within a radius of five miles of the premises in which they have been kept for six months immediately preceding the date of shipment.

Sec. 47. Swine imported for slaughter must be consigned direct to a bonding warehouse, a slaughter house or packing house, must not be removed therefrom alive, and must be slaughtered within ten days after their arrival in Canada.

Sec. 48. Swine found to be suffering from contagious disease will be subject to slaughter without compensation.

Sec. 49. Live swine imported for slaughter and swine carcasses introduced for curing and packing shall not be permitted to come in contact with Canadian animals.

Sec. 50. The cars, trucks and other vehicles employed in such traffic shall not be used for the transport of Canadian animals but shall be immediately sealed and returned to the United States.

Sec. 51. The bonding places and warehouses used for such swine are hereby declared to be infected places, subject to such regulations as the Minister may see fit to adopt for the purpose of preventing the introduction of disease among the live stock of the country.

Sec. 52. The transport of the swine imported for slaughter and of the carcasses imported to be cured and packed, the disposal of all offal, manure and debris and every proceeding in relation to the said traffic shall be subject to inspection and regulation in accordance with the meaning of 'this Order' under the direction of the Minister.

ANIMALS FOR EXHIBITION.

Sec. 53. Animals other than swine may be admitted for purposes of exhibition only, on inspection at port of entry, subject to the usual customs regulations.

IMPORTATION OF ANIMALS FROM MEXICO.

Sec. 54. Any person contemplating the importation of animals from Mexico must, in addition to all other requirements of this order, first obtain from the Minister a permit stating the number and kind of animals to be imported, the district and state in Mexico whence they are to be shipped and the probable date of their arrival at the Canadian port of entry. The person applying for such permit shall furnish satisfactory proof of the facts hereinbefore set forth.

ANIMALS IN BOND.

Sec. 55. Animals passing in bond through United States territory for importation to Canada must be accompanied by a certificate of health signed by a veterinarian of the United States Bureau of Animal Industry and by an affidavit from the owner or importer that the said certificate refers to the animals in question. Such animals shall nevertheless be subject to inspection and if necessary, to detention before being permitted to enter Canadian territory. If found diseased such animals are to be subject to and dealt with according to the orders of the inspecting officer under instructions from the Veterinary Director General.

The expense of treatment, should such be deemed advisable, must be borne by the owner or importer of the animals treated.

Sec. 56. Animals may be admitted from any part of the United States into Canada for transit to any other part of the United States in bond, and (with the exception of swine) will be admitted to Canada in bond for transit to any Canadian

port for exportation by sea to Europe or elsewhere. Such animals are to be subject to inspection at the Canadian port of shipment.

Sec. 57. The transit of such animals shall be subject to such regulations as the minister shall, from time to time, prescribe.

EXPORTATION.

Sec. 58. Canadian animals for transit to any shipping port of the United States for export by sea to Europe or elsewhere must be inspected at such places in Canada as the minister may, from time to time, designate ; must not be shipped from the place of inspection until they have been certified by a duly authorized veterinary inspector to be free from infectious and contagious disease and otherwise fit for export, and must not be permitted by collectors of customs to leave Canada unless accompanied by such certificate.

Sec. 59. Animals for exportation by sea should, if possible, reach the port of exportation not less than twelve hours before shipment for rest and inspection. Animals failing to do so shall be liable to detention in the discretion of the inspector.

Sec. 60. Inspectors shall at all times have full power to detain animals for such time as they consider sufficient to enable them to make a thorough and satisfactory inspection and to ascertain that all the provisions of these regulations relating thereto have been duly observed and complied with.

Sec. 61. Owners or persons in charge of animals for exportation shall give twenty-four hours notice, addressed to the inspector at his office, stating the number and kind of such animals and the expected time of their arrival at the port of exportation.

Sec. 62. No animals shall be permitted to be placed on board any steamship or other vessel for exportation at any Canadian port until they have been inspected and approved by a duly authorized veterinary inspector at such port, and certified by him to be free from contagious disease and in every way fit for export ; such inspection to be made within twenty-four hours of embarkation.

Sec. 63. Inspectors shall, in the performance of their duties, have free access to any ship, car or other vehicle and to any yard, stable or place where animals may be found.

Sec. 64. All inspections for export must be made in daylight.

Sec. 65. Owners or shippers of stock during the progress of inspection at any port of exportation shall, with the means at their disposal, give every required assistance to the inspector at such port, and move the animals according to his directions. In case the owner or shipper refuses or neglects to furnish the necessary assisstance, the inspector may employ men at the cost of the owner or shipper, and such cost shall be paid to the inspector before a clean bill of health is given.

Sec. 66. Inspectors will mark each animal inspected by them and no animals shall be embarked without such mark. A certificate of inspection stating the name of the owner, the number, sex and class of animals in the consignment and certifying to their freedom from contagious disease, will be furnished by the inspector and must be produced to the collector of customs before embarkation.

Sec. 67. Such animals as may be found to have been exposed to contagious or infectious disease, or to be affected with contagious or infectious disease, shall be detained and dealt with according to the orders of the inspecting officer under instructions from the Veterinary Director General.

Sec. 68. Inspectors may reject animals for any reasonable cause.

Sec. 69. The Collector of Customs of any port in Canada whence animals are exported shall not give a clearance to any ship having animals on board for exportation without having produced to him a certificate, signed by the inspector, to the effect that the regulations relating thereto as hereinbefore set forth have been duly observed and complied with.

INFECTED VESSELS.

Sec. 70. Vessels which have carried cattle, sheep or other ruminants, among any of which 'Foot and Mouth Disease' shall have been found, shall be prohibited, for a period of sixty days thereafter, from loading cattle, sheep or other ruminants or swine, in any Canadian port: and, further, until such vessels shall have been thoroughly cleansed and disinfected, under the supervision of an inspector or other duly authorized officer.

HEAD-ROPES.

Sec. 71. The importation of head-ropes which have been used for tying up cattle is prohibited, and all vessels carrying or having on board such head-ropes in contravention of this regulation shall be liable to be declared to be infected under 'The Animal Contagious Diseases Act, 1903.'

CUSTOMS OFFICERS.

Sec. 72. Collectors of Customs throughout Canada shall see that the various exigencies and requirements of the present order are fulfilled before granting any permit which requires, before it is given, any act to be performed, or any inspection or other proceeding to be made or taken, and they shall see that the prohibitions prescribed and rules established by this order as hereinbefore mentioned, and the instructions which may be issued by the Minister are obeyed, and in case of any infraction of the provisions of the present order, or any of them, taking place, they shall report at once to the Minister the nature and extent of such infraction.

GENERAL PROVISIONS.

Sec. 73. To provide against the possibility of diseased animals being carried from place to place, through Canadian Territory, or conveyed to and shipped from ports, it is ordered as follows:—

An inspection of animals may be made at any place or time under authority from the Minister.

Sec. 74. Inspectors shall, in making such inspection, have free access to any vessel, car, yard, stable, shed or place which they may deem it necessary to enter.

Sec. 75. Such animals as may be found affected with or having been exposed to contagious or infectious disease, shall be dealt with according to the provisions of the 'Animal Contagious Diseases Act, 1903.'

Sec. 76. On infectious or contagious disease of animals being discovered on board any steamship, vessel or car, or in any stable, shed, yard or other place, it shall be the duty of the inspector, on the removal of the infected animal or animals, to superintend the thorough disinfection of such steamship, car, stable, shed, yard or other place, without loss of time, in the manner prescribed under the general regulations for disinfection of premises.

Sec. 77. All yards, stables, sheds or other premises used (by railway or steamship companies or other persons) for the accommodation of animals, shall be maintained in a clean, comfortable and sanitary condition and shall be subject at all times to inspection by inspectors acting under the authority of the Minister, who, when they deem such action necessary, may order the cleansing and disinfection in a satisfactory manner of the said yards, stables, sheds, or other premises, as provided in the 'Animal Contagious Diseases Act., 1903.'

Sec. 78. In the event of any owner, lessee or occupant of any yard, stable, shed or other premises (or any railway or steamship company or person) refusing or neglecting to carry out the orders of the inspector in regard to cleansing and disinfection as aforesaid, or in the event of such owner, lessee or occupant, company or person neglecting to maintain his or its yards, stables, sheds or other premises for the use of animals, in a clean, comfortable and sanitary condition, the inspector may condemn the said premises as unfit for use, whereupon the said premises shall not be used for the accommodation of animals until such time as the orders of the inspector in regard thereto have been satisfactorily carried out.

Sec. 79. No animals are to be allowed to be placed on board cars till the litter from the previous load has been removed, and the car white-washed with lime and carbolic acid, in the proportion of 1 pound commercial carbolic acid to 5 gallons of lime wash.

Sec. 80. Shippers may refuse to place their animals on uncleaned cars, and may lodge a complaint with the nearest inspector, who shall either cause such cars to be cleansed and disinfected, as above, at the expense of the railway company, or shall prohibit their use until they have been so cleansed and disinfected.

Sec. 81. Any person who violates any provision of the 'Animal Contagious Diseases Act, 1903,' or any provision of this Order, shall incur the penalties prescribed by the said Act.

REGULATIONS.

RELATING TO IMPORTATION OF HORSES, MULES AND ASSES.

Notice is hereby given that under and by virtue of the powers vested in me by Order in Council, dated the 30th day of March, 1904, I do hereby order and declare that the following regulations relating to the importation into Canada of certain classes of horses, mules and asses are in full force and effect on and after the date hereof :—

1. Horses, mules and asses which have originated in or passed through the Republic of Mexico, or that portion of the United States lying west of the Mississippi River, and of the Eastern Boundary of the State of Minnesota, shall be inspected, and if gentle and thoroughly broken to harness or saddle may be admitted at any quarantine or inspection port, as follows :—

Quarantine Ports—Halifax, N.S.; St. John, N.B.; Charlottetown, P.E.I.; Quebec, Sherbrooke and St. Johns, Que.; Niagara Falls, Windsor and Sarnia, Ont.; Emerson, Man. ; North Portal, Wood Mountain, Pendant d'Oreille, Coutts and Cardston, N.W.T.; Gateway, Rossland, Nelson, Grand Forks, Vancouver and Victoria, B.C.

Inspection Ports—Pictou, North Sydney and Yarmouth, N.S.; St. Stephens, Woodstock and McAdam Junction, N.B.; Comin's Mills, Lake Megantic, Coaticook, Stanstead Junction, Mansonville, Abercorn, St. Armand, Rouse's Point, Athelstan and Dundee, Que.; Cornwall, Prescott, Brockville, Toronto, Bridgeburg, Sault Ste. Marie and Port Arthur, Ont. ; Gretna, Morden, Mowbray, Crystal City, Killarney, Deloraine, Melita and Winnipeg, Man.; Rykerts, Waneta, Midway, Sidley, Sumas, New Westminster, Douglas and Nanaimo, B.C.

2. Inspectors shall, however, in any case, have the power to detain, isolate, submit to the mallein test, dip or otherwise treat such horses, mules and asses as they may have reason to believe or suspect are affected with, or have been exposed to infectious or contagious disease.

3. Branded or range western horses, other than those which are gentle and thoroughly broken to harness or saddle, may be admitted only at the following ports :—

Sarnia, Ont.; Emerson, Man.; North Portal, Wood Mountain, Pendant d'Oreille, Coutts and Cardston, N.W.T.; Gateway, Rossland, Nelson, Grand Forks, Vancouver and Victoria, B.C., and subject to the following regulations :—

(*a*) Such horses must be accompanied by a certificate signed by a Veterinarian of the United States Bureau of Animal Industry, or by a State veterinarian, stating that they are free from infectious and contagious disease, and that no infectious or contagious disease of horses has existed in the district whence they have come, for the period of six months immediately preceding the date of their removal therefrom.

(*b*) Owners or persons in charge shall afford to Inspectors every facility and assistance for inspecting and otherwise dealing with such horses and shall secure and handle them as directed by the inspectors.

(*c*) Such horses shall, in all cases, be subject to detention for such period as the inspectors may deem necessary to determine, whether they are free from infectious and contagious disease, and shall be isolated, submitted to the mallein test, dipped or otherwise treated, if the inspector so orders.

SYDNEY FISHER,
Minister of Agriculture.

Department of Agriculture,
Ottawa, March 31st, 1904.

THE BREEDING OF REMOUNTS—AN ADDRESS DELIVERED AT THE OTTAWA FAT STOCK SHOW, MARCH, 1904.

The subject on which I have been asked to speak to you this morning, viz., the breeding of horses for army use, is one which, while perhaps not of paramount importance to Canadian stock men, is well worthy of consideration in a gathering such as this.

For many years past, this question has occupied the attention of Canadian horsemen to a greater or less extent and many efforts have been made, particularly by the residents of western Canada, to introduce the War Office to take steps in the direction of establishing remount stations in the Dominion.

As far back as 1886 a commission, consisting of Colonel Ravenhill of the Royal Artillery, and Colonel Phillips and Veterinary Surgeon Matthews of the Royal Horse Guards visited Canada and reported fully on the possibilities of the Dominion as a source for furnishing the then much needed remounts for military purposes. These gentlemen purchased a limited number of horses and by their representations, several breeders, particularly in Alberta, were led to invest largely in foundation stock with a view to furnishing the horses which it was supposed would be eagerly sought after and purchased by the army authorities. A considerable number of Thoroughbred stallions of the best and most fashionable blood in Britain and America were purchased and placed on the ranches, while one establishment went so far as to import 300 Irish mares with the view of producing high class military horses. No reward, however was vouchsafed to the enterprise thus displayed as not a single horse, so far as the speaker is aware, was purchased in Canada by the British War Office between 1886 and 1900, although a large number of magnificent animals were produced on the ranges above referred to. The North-west Mounted Police bought as many of the horses as were required in that service, while a considerable number of others were purchased from time to time, for the French, Belgian and Dutch armies, none, however, being asked for by the British War Office. As a result of this disappointment, the gentlemen who had gone into the project with energy and vigour, became disgusted and either abandoned horse breeding altogether or turned their attention to the production of animals suited for heavy draft or farm work.

The suitability of Canada as a breeding ground for remounts was repeatedly brought to the notice of the British government by western breeders as is shown by the correspondence which I had carefully reprinted a few years ago when I occupied the position of president of the Horse Breeders Association of Manitoba and the North-west Territories.

No encouragement was, however, given until the advent of General Hutton who took an active interest in the matter, and showed himself anxious to bring about a better understanding between the army authorities and the horse breeders of the Dominion.

The outbreak of the war in South Africa and the consequent keen demand for horses to be used on service was the means of again relegating to the back ground the project of establishing permanent remount depots in this country.

During the continuance of the war a large number of horses, many of them nondescripts, were purchased and the effect of this action, contrary to what might be generally imagined, was the confusing, to a large extent, of the public understanding as to the types of horses required for and purchased by the British Army authorities during times of peace. There is a great difference between the class of horses bought under ordinary circumstances and the animals which must be accepted during war, when the wastage of horse flesh is excessive and the demand far exceeds the supply.

Many horses were purchased by the army officers operating here during the South African campaign which would never be looked at in times of peace, and this fact must be borne clearly in mind by those listening to this paper and the discussion to which I hope it will give rise. As a striking proof of the truth of the statement which I have just made I may say that the Ravenhill Commission spent 167 days in Canada, travelled 14,755 miles, examined 7,674 horses of which, 1,025 were registered to be looked at a second time, with the significant result that they were only able to purchase for army purposes, 83 horses.

No objection was raised as to prices which were looked upon as very reasonable and moderate and it was not the question of money which prevented their purchasing in larger numbers. The reasons which prevented the purchase of more animals in 1886 were fully explained by the commissioners and I regret to have to say, still exist to a very large extent throughout the Dominion. These officers found that the majority of the horses which would otherwise have been suitable for military purposes were unsound or blemished, this being particularly due to the overworking of the horses when too young, resulting in permanent injury to their limbs and joints.

In the case of mares, this evil is perpetuated from generation to generation, while large numbers of faulty and unsound stallions, then as now, contributed largely to the evil.

Another objection to Canadian horses and which was by them attributed, I think, rightly to the too extensive and indiscriminate use of the American trotter for stud purposes, is the fact that they are not of saddle type, many of them having poor straight shoulders, a long back, and short and drooping hind quarters, the latter being a serious objection in the case of a mounted soldier carrying his kit behind the saddle.

It was stated then and I fear it is still too true, that it is the exception to meet with a Canadian horse having a lengthy rein and quarters, good withers and oblique shoulders, this type of horse being only procurable by a judicious mixture of Thoroughbred which has unfortunately, especially in recent years, been far from popular among the light horse breeders of the Dominion. The foregoing remarks are applicable to the majority of horses required for army use although the characteristics of military horses vary with the work which they are intended to perform.

Without again recounting all the arguments which have been repeatedly advanced as to the suitability of the climate and soil of Canada for the raising of all classes of horses, the advantage in time of stress of being able to purchase in a British colony when foreign markets might be closed against us and the convenience of shipping either

to the far east or to Europe, I now propose to give a brief description of the types of animals usually sought for and purchased for use in our military service as also a few hints as to how they may be most easily and certainly produced.

Three fairly distinct classes are comprised by the term army horse or 'remount' as he is technically styled. Of these the most important has hitherto been and still is the cavalry horse although the nature of modern warfare seems likely to relegate him ere long to a second or even a third place in the scale. This horse is of the distinctly riding type, that is to say, he must be well bred with clean head, lengthy rein, sloping shoulder, deep through the heart, well ribbed up with a strong short back, good loin, long straight quarters and tail well set on.

He must, when full grown, stand squarely and on short legs not less than 15—2 nor more than 16 hands, should girth six feet or more and measure not less than eight inches below the knee. He must be essentially a strong horse as the British cavalry trooper with his arms and kit, looking as Toomy Atkins says 'like a bloomin' Christmas tree on horse-back,' rides from 250 to 280 lbs. weight and his mount must be able to move freely under this killing load.

Such animals are not very plentiful in any country and in fact, are constantly growing more difficult to procure. They can best be obtained by the judicious use of selected T. B. sires on strong half-bred mares, on those having an admixture of hackney or coach blood, on strong roadster mares and in Canada on fair sized and symmetrical French mares. On light roadster mares showing a tendency to weediness, a hackney sire having plenty of quality may be used with advantage.

The artillery or army draft horse is of an entirely different type and is more easily picked up than the trooper. He may best be described in general, as an active quick moving vanner or expresser, the horse known in Glasgow as the 'Gyp,' having enough quality to stand hard, fast work with sufficient substance and strength to handle his share of a by no means light load. He should be a clean-legged solid horse with plenty of bone, able to trot out freely and above all to walk well. A proportion of draft blood is not objectionable in the wheelers, especially for field artillery and even horse artillery wheelers must be extra strong in the back and quarters as they have to take and hold the shock of the heavy gun in a sudden halt.

For the horse artillery as also for the lead and centre pairs of field artillery, a lighter and more breedy horse is required : thus more variation is permissible among gun horses than in those for cavalry use.

Many of our lighter general purposes horses are exceedingly well adapted for artillery work as was plainly demonstrated during the recent campaign in South Africa. The lighter types can be obtained by using a strong, stout T. B. horse on mares of size and action or by breeding biggish road mades to a good hackney or French coach horse. Many of the best gunners are bred from the T.B. horse and Suffolk mares.

The mounted infantry horse is simply a strong well-bred pony or cob with as much riding character, as possible. He should have a good rein and an oblique free shoulder should be deep through the heart, and have a strong back with a good loin and quarter. He should stand squarely on short legs not less than 14—1 nor more than 15—1. The favourite height is about 14—3.

He can be easily got by using a stout T. B. sire on French Canadian or other strong pony mares or by stinting the undersized trotting bred mares so common in Canada to a good hackney stallion, the latter being also, undoubtedly, the best horse to use in breeding from Western ponies.

Except during war, horses are bought only between 4 and 7 years old. Bays, browns and blacks are preferred, while chestnuts, especially dark chestnuts are not rejected if otherwise suitable. Blacks are especially in demand for the Household cavalry ; about fifty grey troopers and a few grey artillery horses are purchased each year for special corps, but no parti-coloured horses are wanted. Mares are purchased as well as geldings though the latter are preferred. Unsound or badly blemished horses are not taken, the veterinary examination being very strict and searching.

Un-docked horses are greatly preferred and no horse with a very short docked tail will be taken.

It is to be sincerely hoped that the negotiations now in progress will result in the establishment of permanent purchasing depots in the Dominion, for the reason that apart from any other benefits which might result, such a step would be certain to bring about a rapid improvement in the quality of the lighter horses which, whatever may be said to the contrary, will continue to be extensively bred, especially in certain localities.

The objection has been raised in certain quarters that it will not pay Canadian farmers to breed horses suitable for army purposes at the prices at which they have to be purchased by the War Office. This objection has weight, and I would not advise any Canadian farmer or horse breeder to start in with the avowed purpose of breeding horses for military purposes, but when we consider the large prices procurable for high class horses suitable for hunters', saddle horses or harness work, there can surely be no question as to the advisability of endeavouring to breed such animals in preference to the nondescripts now so strongly in evidence everywhere throughout the Dominion. Let the breeder of light horses aim to produce a type of the highest class and if he fails, as fail he will, to do so in every instance, he will still be likely to have an animal well adapted for army work and which, if matters progress as they are now doing, will find a ready market.

Again, admitting that it will not pay the farmer to deliberately breed mounted infantry ponies, I would point out that thousands of ill conditioned and mis-shapen little weeds are annually produced in all parts of the Dominion which might, very profitably be supplanted by stout, useful, symmetrical cobs, the best of which would be in keen demand at high figures, while the remainder would be well suited to supply this comparatively new military need.

J. G. RUTHERFORD,
Veterinary Director General.

REPORT OF CANADA'S PARTICIPATION IN THE CONFECTIONERS', BAKERS', AND ALLIED TRADERS' EXHIBITION, THE GROCERY AND ALLIED TRADERS' EXHIBITION, THE DAIRY EXHIBITION.

All held at the Royal Agricultural Hall, Islington, N. London, England, September and October, 1904.

These exhibitions are altogether of a trade character, each being held in the interests of its special line of business, they are annual fixtures and various competitions take place in connection with them, apart from the regular competition of exhibitors for prizes awarded in various classes.

The Managing Directors of the two first named extended an invitation to Canada, offering the necessary space free of charge, and at the same time pointing out the advantages offered for the exploitation of our food products and that to people directly interested, the invitation was accepted and instructions were issued to this branch to prepare a suitable display.

The exhibitions are competitive, but it was not deemed advisable to enter into any of the competitions this season, it being our first venture and rather of an experimental nature ; a space of 12 x 100 feet was secured in that portion of the building known as the Minor Hall and the best location therein reserved on which was erected a stand the full size of the space, over this series of arches were sprung with an overhead decoration of grains, grasses, photographs, flags and shields, making a very attractive setting which was much admired by visitors, being altogether out of the ordinary run of decoration as generally used ; many seeing it were reminded of Canada's Coronation arch at Whitehall.

The Canadian exhibit consisted of, first in the Confectioners', Bakers' and Allied Traders' Exhibition, flour of different grades, but more especially that made from hard wheat, fruits, natural, preserved in antiseptic and tinned, biscuits, confectionery, chocolates, maple creams, maple sugar, maple syrup, honey drawn and in the comb, eggs, butter, lard, baking powder, condensed milk and cream, &c.

In the Grocery and Allied Traders' Exhibition all of the above were included with the addition of tinned vegetables, meats, soups, fish, wines, whiskies, hams, bacon, cheddar, Oka, and potted cheese, various cereals, breakfast foods, buckwheat flour, starch, corn, syrup, dressed poultry, &c.

And at the Dairy Show the principal exhibits were butter, cheddar, Oka and potted cheese, hams, bacon, lard, eggs, dressed poultry, fruits and a few tinned meats.

The attendance was good throughout and consisted mainly of people interested in the exhibits, conferences were held in connection with each exhibition and excursions were run from all parts of the kingdom; at the first exhibition the inquiries were principally from bakers and manufacturing confectioners and referred mostly to flour, eggs, butter, maple products, fruits, &c., at the second exhibition, fruits tinned and in glass, wines, bacon, cereal breakfast foods, cheese and butter ; and at the third exhibition, butter and cheese mainly; many of these inquiries were from dealers in the provinces who particularly wanted addresses of agents or representatives at London, Liverpool, Glassgow, Bristol, or other ports with a view to procuring lines of Canadian products as quickly as possible, needless to say all possible information was given in each and every case. In most cases the inquiries were answered on the spot, but occasionally when some particular details were sought for of which the data was not at hand, it was subsequently forwarded, at the Dairy Show many inquiries were made

by persons contemplating removing to Canada to take up western lands, to answer these fully, a representative of the immigration office in London was in attendance.

As stated above the Canadian exhibits were not entered for competition, nevertheless many of the judges in different classes tested our products and expressed themselves as highly pleased with them and in several instances classed them as equal to the prize winners.

On the opening day of each of these exhibits a press luncheon was held, your representatives had the pleasure of attending two of these and were called upon to reply to the toast of 'Success to Canada' at one of them; in this connection we have to sincerely thank the representative of both the daily and trade press for the very cordial manner in which they received us, more especially that devoted to the trade represented at the exhibitions. All of the leading journals devoted large portions of space to describing our exhibit, Canada's enterprise, &c.

Thanks are due to the High Commissioner for Canada for the hearty manner in which he assisted in the carrying out of this work and placed every facility at the disposal of your officers so as to bring it to a successful issue.

Thanks are also due to Mr. W. A. Aylwin, managing director and his co-directors who placed themselves entirely at our disposal, granting us privileges and opportunities which were of much value, and they sincerely hope that Canada's participation in these exhibits may now be considered an annual feature.

JAMES BRODIE.
W. H. HAY.

PATENTS OF INVENTION.

RULES AND FORMS OF THE CANADIAN PATENT OFFICE, BY ORDER IN COUNCIL, DATED 23RD FEBRUARY, 1904.

1. A personal appearance of the applicant, or his representative, at the Patent Office is not required, unless specially called for by the Commissioner.

2. In all cases the applicant or depositor of any paper is responsible for the merits of his allegations, and the validity of the instruments furnished by him or his agent.

3. Correspondence may be carried on either with the applicant, or his agent, but only with one person, and will be conveyed through the Canadian mails free of charge.

4. All documents must be legibly and neatly written or printed on foolscap paper, 13 inches long and 8 wide, with an inner margin of one inch and a half wide.

5. All communications are to be addressed—'*The Commissioner of Patents, Ottawa, Canada.*' Papers forwarded to the office should be accompanied by a letter, and a separate letter should be written on every subject.

6. As regards proceedings not specially provided for in the accompanying forms, any other form being conformable to the letter and spirit of the law may be accepted, and if not conformable therewith will be returned for correction.

7. Models need only be furnished when required by the Commissioner, and must be neat and substantial working ones, not exceeding twelve inches on the longest side, unless otherwise allowed by special permission : models must be so constructed as to show exactly every part of the invention claimed and its mode of working. In cases where samples of ingredients are required by law, they must be contained in glass bottles properly arranged ; but dangerous or explosive substances must not be sent. Both models and bottles must bear the name of the inventor, the title of the invention and date of the application ; they must be furnished to the Patent Office free of charge and in good order.

8. All fees should be transmitted with the application for any action by the office. Remittances must be in current bankable funds, bank drafts, money orders, or certified cheques payable at par at Ottawa. Money sent by mail should be in registered letters and is at the risk of the sender. Drafts, money orders and cheques should be made payable to the Commisisoner of Patents, Ottawa.

9. An applicant for an original patent, or for the re-issue of a patent, shall proceed with his application with due diligence ; and upon his failure to prosecute the same within a period of one year after the date of the acknowledgment of the filing of his application, or other subsequent official action of which notice have been duly given, the same shall be held to be abandoned, and any fees paid thereon forfeited, unless the Commissioner is satisfied that the cause of the delay was not the fault of the applicant.

In any case, however, in which it is established to the satisfaction of the Commissioner that there is unnecessary delay on the part of the applicant in the prosecution of his application, and that such delay may injure the rights of other parties, the Commissioner may require the applicant to proceed with the prosecution of his application within such period less than one year as to the Commissioner may seem reasonable ; and upon the failure of the applicant so to do, his application shall be held to be abandoned, with forfeiture of fees, as aforesaid.

Prosecution of an application, to save it from abandonment, must include such proper action as the condition of the case may require.

10. Two or more separate inventions cannot be claimed in one application, nor included in one patent. But if separate matters are represented to be so dependent on, and connected with, each other as to be necessarily taken together, to obtain the end sought for by the inventor, the Commissioner of Patents shall be the judge whether or not the pretentions of the applicant in such respect can be entertained.

11. The filing of a protest against the issuing of a patent shall not be taken in itself as sufficient reason to withhold the granting of such patent to an applicant.

12. A *Caveat* can only be filed by an inventor, and shall be composed of a specification (*and drawings*), certified on oath [Form No. 23] and the applicant may, while it is pending, lodge additional papers, provided they relate exclusively to the same invention. The person filing a *Caveat* will not be entitled to notice of any application pending at the time of filing his *Caveat*. A *Caveat* must be limited to a single invention.

The specification of a *Caveat* should be sufficiently precise to enable the Office to judge whether there is a probable interference when a subsequent application is filed.

13. Drawings in duplicate, to be attached to the duplicate specification, must be made in India or carbon ink, on sheets of tracing cloth other than Linaura or similar fabric, eight by thirteen inches, neatly executed and without colours.

Each sheet of tracing linen shall contain the following certificate at the bottom : 'Certified to be the drawings referred to in the specification hereunto annexed,' and signed by the inventor or his attorney ; place, date, and signature of two witnesses.

All drawings must be clear, sharp, well-defined, not too fine *and perfectly black.*

Lines that are pale, ashy, very fine, ragged or broken, give bad results when photo-lithographed.

Brush-shading, tinting and imitation surface graining should never be used ; and in fine-shading the result should be attained with as few lines as possible.

Section lines also should be as open in their spacing as the case will admit of, and these, as well as all right lines, in order to insure clearness, should be made with a ruling pen. The shading of convex and concave surfaces may be dispensed with when the invention is otherwise well illustrated.

Shade lines may sometimes be used with good effect, but heavy shadows where they would obscure lines or letters of reference, should be avoided.

With each application an extra full set of drawings must be supplied on double Bristol Board. 8 by 13 inches, without writing on its face, merely the usual reference letters ; no title, certificate, nor signatures ; on the back of the sheet the name of the inventor and the title of the invention must be written in pencil.

The card board drawing should be rolled on a roller for transmission to the office. as folding will prevent its usefulness for photo-lithographing.

14. In the matter of a re-issue, under Section 23 of the Act, whatever is really embraced in the original application and so described or shown in the same, that it might have been embraced in the original Patent, may be ground for a re-issue. No new matter can be introduced into the specifications, nor shall the models or drawings be amended except each by the other. In the absence of model or drawing, the re-issue may contain amendments, upon satisfactory proof to the Commissioner that such amendments were part of the invention, although omittted in the original application. Separate patents may be issued for each separate and distinct part of the invention, comprehended in the original patent.

15. Information in relation to pending applications will be furnished only to applicants, or to such persons as may be duly authorized in writing by them to obtain the same.

16. The Office can not respond to inquiries as to the probability of an alleged invention being patented in advance of an application for a patent ; nor to inquiries founded on brief or imperfect descriptions, propounded with a view of ascertaining whether alleged improvements have been patented, nor unless the name of the patentee, and, as nearly as possible, the date of the Patent, be given ; nor can it act as

an expounder of the Patent Law, nor as counsellor for individuals, except as to questions within the office.

In order to avoid unnecessary explanations and useless loss of time and labour, it is particularly recommended that reference be made to the law before writing on any subject to the Patent Office.

A copy of the Rules with a particular section marked, sent to any person making an inquiry, will be deemed a respectful answer by the Office.

17. It is desirable, both in the interests of the applicant and of the public service, that the papers and drawings should be prepared by competent persons. Therefore, the applicant is advised, unless himself competent to draw up papers, in connection with the application, to employ a skilled attorney, as the value of patents is largely based upon the ability with which the specification and claims have been prepared. The Office will always decline to advise the selection of an attorney.

18. All business with this Office should be transacted in writing. The action of the Office will be based exclusively on the written record. No attention will be paid to any alleged averbal promise or understanding in relation to which there is any disagreement or doubt.

19. An assignment is to be accompanied by a copy thereof ; the original will be kept in the Patent Office, and the copy will be returned to the person sending it, with certificate of registration thereon.

20. All cases connected with the intricate and multifarious proceedings arising from the working of the Patent Office, which are not specially defined and provided for in these rules, will be decided in accordance with the merits of each case under the authority of the commissioner ; and such decision will be communicated to the interested parties in writing.

21. Applications for patents sent to this office, unaccompanied by the fee provided by law, will receive no official recognition, nor be filed nor numbered ; they will merely be pigeon-holed, and only marked filed the day on which the fee shall have been received.

22. The applicant has a right to amend before or after the first rejection or action; and he may amend as often as the examiner presents new references or reasons for rejection. In so amending, the applicant must clearly point out by letter accompanying his amendments and not therein, all the patentable novelty which he thinks the case presents in view of the state of the art disclosed by the references cited or the objections made. He must also show how the amendments avoid such references or objections.

23. The specification and drawing must be amended and revised when required, to correct inaccuracies of description or unnecessary prolixity, and to secure correspondence between the claim, the specification and the drawing. But no change in the drawing may be made except by written permission of the office.

24. Amendments must not be made by erasures or insertions in the original papers, but must be made on fresh sheets of paper, so that the sheets containing the matter to be amended may be removed from the application and replaced by sheets containing the amendments.

Amendments to the specifications must be made in duplicate, and those to the claims in triplicate.

COMPULSORY LICENSES.

25. A petition to the Commissioner for an order for a license under section 7, paragraph (a), of the Act to amend the Patent Act, 1903, shall show clearly the ground or grounds upon which the petitioner claims to be entitled to a license, and shall state in detail the circumstances of the case, the terms upon which he asks that an order may be made, the purpose of such order, and the name and address of the patentee and of any other person who is alleged in the petition to have made default.

26. The petition and an examined copy thereof shall be left at the Patent Office, accompanied by affidavits or statutory declarations in proof of the allegations contained in the petition, together with any other documentary evidence in support; and petitioner shall within ten days after the leaving of such petition deliver to the patentee and any other person who is alleged in the petition to have made default, copies of the petition and of such affidavits or statutory declarations and other documentary evidence in support.

27. The person to whom such copies are delivered by the petitioner may, within ten days after being invited to do so by the commissioner, leave at the Patent Office their oppositions to such petition, together with their affidavits or statutory declarations or other documentary evidence in support, in answer, and if they do so, shall deliver copies thereof to the petitioner within ten days, and the petitioner may within ten days from such last mentioned delivery leave at the Patent Office his affidavits or statutory declarations and other documentary evidence, in reply; and if he does so, shall deliver copies thereof to the patentee or any other person alleged in the petition to have made default within ten days, such last mentioned affidavits or statutory declarations being confined to matters strictly in reply.

28. No further evidence than as aforesaid may be left by either side at the Patent Office, except by leave or on requisition of the Commissioner, and upon such terms, if any, as he may think fit.

29. The Commissioner may at any stage of the proceedings before granting his order, give notice of the proceedings, and furnish copies thereof to any person not a party thereto who may be interested in the patent and whose rights may be affected by his order, and may allow such person to intervene in the proceedings. After such person has been allowed to intervene, he shall be governed by these rules as though the petitioner had alleged in his petition that such person was in default.

30. On completion of the evidence, or after the expiration of the time for completing the same, the commissioner, on the request of the petitioner, shall fix a time for hearing the petition, and shall give notice to the petitioner, the patentee, and all other parties to the proceedings, that it is his intention to hear the petition on a specified day, which day shall not be less than two weeks from the date when the notice is served.

31. All petitions and other documents lodged at the Patent Office shall (unless the commissioner otherwise direct), be typewritten or printed, and the parties shall furnish as many copies of the documents lodged by them as shall be required by the commissioner.

32. Parties shall be entitled to have copies of all papers lodged in respect to the petition, at their own expense. The petitioner and each of the other parties shall specify an address for service in Canada, and may be heard in person or by counsel or by a duly authorized agent.

33. The commissioner shall, if so requested, hear counsel on behalf of the Crown on the question of granting the prayer of any petition. Counsel on behalf of the Crown shall not be required to give notice of the grounds of any objection he may think fit to take or of any evidence which he may think fit to place before the commissioner.

34. Any notice required to be served or given by the rules relating to compulsory license may be served or given by posting the same to the party to be notified in a registered envelope, and documents required to be delivered may be delivered in the same way.

35. The times prescribed by these rules may be altered or enlarged by the commissioner if he thinks fit, upon such notice to parties interested and upon such terms, if any, as he may direct.

APPENDIX OF FORMS.

PETITIONS.

FORM 1.

BY A SOLE INVENTOR.

To the Commissioner of Patents, Ottawa :

The petition of John Smith, of the city of Toronto, in the province of Ontario, carpenter, showeth :

That he hath invented new and useful improvements in machines for breaking stones, not known or used by others before his invention thereof, and not being in public use, or on sale, with his consent or allowance as such inventor, for more than one year previous to his application for a patent therefor, in Canada.

Your petitioner, therefore, prays that a patent may be granted to him for the said invention, as set forth in the specification in duplicate relating thereto, and, for the purposes of the Patent Act, your petitioner elects his domicile in the city of Ottawa, province of Ontario.

JOHN SMITH.

TORONTO, September 1, 1887.

FORM 2.

BY JOINT INVENTORS.

To the Commissioner of Patents, Ottawa :

The petition of James Thomas, blacksmith, and George Robert Major, tinsmith, both of the city of Ottawa, in the county of Carleton, in the province of Ontario, showeth :

That they have jointly invented a new and useful improvement in the art or process of separating smut from wheat, not known or used by others before their invention thereof, and not being in public use, or on sale, with their consent or allowance as such inventors, for more than one year previous to their application for a patent therefor, in Canada.

Your petitioners, therefore, pray that a patent may be granted to them jointly for the said invention, as set forth in the specification in duplicate relating thereto, and, for the purposes of the Patent Act, your petitioners elect their domicile in the city of Ottawa, province of Ontario.

JAMES THOMAS,
GEORGE ROBERT MAJOR.

OTTAWA September 1, 1887.

FORM 3.

BY AN ADMINISTRATOR OR EXECUTOR.

To the Commissioner of Patents, Ottawa :

The petition of James Clayton, of the city of Kingston, in the province of Ontario, stonecutter, administrator of the estate (or executor of the last will and testament)

of Thomas Clayton, in his lifetime, of the said city of Kingston, deceased, millwright (as reference to the duly certified copy of letters of administration, or letters testamentary, hereto annexed will more fully appear), showeth :

That the said Thomas Clayton did invent a new and useful composition of matter for making artificial stone, not known or used by others before his invention thereof, and not being in public use or on sale, with the consent or allowance of the said Thomas Clayton as such inventor, for more than one year previous to this application for a patent therefor, in Canada.

Your petitioner, therefore, prays that a patent may be granted to him, as administrator (or executor) of the estate of the said Thomas Clayton for the said invention, as set forth in the specification in duplicate relating thereto, and, for the purposes of the Patent Act, your petitioner elects his domicile in the city of Ottawa, province of Ontario.

JAMES CLAYTON.

KINGSTON, September 1, 1887.

FORM 4.

FOR A RE-ISSUE (BY THE INVENTOR).

To the Commissioner of Patents, Ottawa :

The petition of Thomas Brown, in the city of Ottawa, in the province of Ontario, lumber manufacturer, showeth :

That your petitioner obtained a patent bearing date the twelfth day of August, A.D. 1886, for a new and useful improvement in churns.

That the petitioner is advised that the said patent is deemed defective, or inoperative, by reason of insufficient description or specification, and that the errors arose from inadvertence, accident or mistake, without any fraudulent or deceptive intention.

Your petitioner, being desirous of obtaining a new patent in accordance with the amended description and specification in duplicate, therefore prays that he may be allowed to surrender the aforesaid patent, and a new patent be granted to him, in accordance with the amended description and specification of the said invention, for the unexpired period for which the orginal patent was granted.

THOMAS BROWN.

OTTAWA, September 1, 1887.

FORM 5.

FOR A RE-ISSUE (BY THE ASSIGNEE).

To the Commissioner of Patents, Ottawa :

The petition of David Lane, of the town of Cobourg, in the county of Northumberland, province of Ontario, tanner, showeth :

That your petitioner, by assignment bearing date the 24th day of June, 1887, obtained the exclusive right to a patent granted to Thomas Tardy, of the city of Ottawa, province of Ontario, broommaker, on the 1st of July, 1885, for new and useful improvements in planing machines.

That your petitioner is advised that the said patent is deemed defective or inoperative by reason of insufficient description, or specification, and that the error arose from inadvertence, accident or mistake, without any fraudulent or deceptive intention.

Your petitioner, being desirous of obtaining a new patent in accordance with an amended description and specification in duplicate, therefore prays that he may

be allowed to surrender the aforesaid patent, and that a new patent be granted to him, as assignee of the said Thomas Tardy, in accordance with the amended description and specification of the said invention, for the unexpired period for which the original patent was granted.

DAVID LANE.

COBOURG, September 1, 1887.

The above form is to be altered to suit the case, when the re-issue is to the administrator, or executor, of a deceased inventor.

FORM 6.

SURRENDER FORM TO ACCOMPANY APPLICATION FOR RE-ISSUE.

To all to whom these presents shall come, Thomas Brown, of the city of Ottawa, in the province of Ontario, lumber manufacturer, within named, sends greetings :—

Whereas the within written patent, for an improvement in churns, is deemed defective, or inoperative, by reason of insufficient description, or specification, and the error arose from inadvertence, accident or mistake, without any fraudulent or deceptive intention, and the Commissioner of Patents accordingly, in pursuance of the statute in such respects, hath agreed to accept the surrender of the same ;

Now know ye, that the said Thomas Brown, within named, doth by these presents surrender and yield up the within written patent, granted to him for improvements in churns, and bearing date the 8th day of June, 1886.

In witness whereof the said Thomas Brown hath set his hand and affixed his seal this first day of September, A.D., 1887.

THOMAS BROWN. [L.S.]

Signed, sealed and delivered at the city of Ottawa, in the County of Carleton, in the province of Ontario, in the presence of

HENRY COCKBURN.

FORM 7.

POWER OF ATTORNEY.

To the Commissioner of Patents, Ottawa :

The undersigned, John Brown, of the town of Cornwall, in the County of Stormont, in the province of Ontario, storekeeper, hereby appoints John Smith, of the city of Ottawa, province of Ontario, his attorney, with full power of substitution and revocation, to prosecute an application for new and useful improvements in sewing machines, to make alterations and amendments therein, to sign the drawings, to receive the patent and to transact all business in the Patent Office connected therewith.

Signed at Cornwall, this 1st day of September, 1887.

JOHN BROWN.

In the presence of
JOHN SMITH.

FORM 8.

REVOCATION OF POWER OF ATTORNEY.

To the Commissioner of Patents, Ottawa :

The undersigned, John Brown, of the town of Cornwall, in the County of Stormont, in the province of Ontario, storekeeper, having on or about the 1st September, 1887, appointed John Smith of the city of Ottawa, province of Ontario, his attorney, to prosecute an application for a patent for new and useful improvements in sewing machines, hereby revokes the power of attorney then given.

Signed at Cornwall, this thirteenth day of September, 1887.

JOHN BROWN.

In the presence of
JOHN SMITH.

SPECIFICATIONS.

FORM 9.

FOR A MACHINE.

To all whom it may concern :

Be it known that I William Woodworth, of the town of Poughkeepsie, in the County of Duchess, in the State of New York, gentleman, having invented certain new and useful improvements in meat chopping machines (for which I have obtained a patent in [here name the country] No. , bearing date 189),* do hereby declare that the following is a full, clear, and exact description of the same.

My invention relates to improvements in meat-chopping machines in which vertically-reciprocating knives operate in conjunction with a rotating chopping-block ; and the objects of my improvement are, first, to provide a continuously-lubricated bearing for the block ; second, to afford facilities for the proper adjustment of the knives independently of each other in respect to the face of the block ; and, third, to reduce the friction of the reciprocating rod which carries the knives.

* NOTE.—If no foreign patent has been obtained the words in parenthesis should be omitted.

I attain these objects by the mechanism illustrated in the accompanying drawing, in which—

Figure 1 is a vertical section of the entire machine ; Fig. 2, a top view of the machine as it appears after the removal of the chopping-block and knives: Fig. 3, a vertical section of a part of the machine on the line 1, 2, Fig. 2; and Fig. 4, a detailed view in perspective of the reciprocating cross-head and its knives.

Similar letters refer to similar parts throughout the several views.

The table or plate A, its legs or standards B B, and the hanger *a*, secured to the under side of the table, constitute the frame-work of the machine. In the hanger *a* turns the shaft D, carrying a fly-wheel E, a crank-pin, on the hub of which is connected by a link *b* to a pin passing through a cross-head G, and to the latter is secured a rod H, having at its upper end a cross-head I, carrying the adjustable chopping-knives *d d*, referred to hereinafter.

The cross-head G, reciprocated by the shaft D, is provided with antifriction rollers *e e*, adapted to guides *f f*, secured to the under side of the table A, so that the reciprocation of this cross-head may be accompanied with as little friction as possible.

To the under side of a wooden chopping-block J is secured an annular rib *h* adapted to and bearing in an annular groove *i* in the table A. (See Figs. 1 and 2.) This annular groove or channel is not of the same depth throughout, but communi-

cates at one or more points (two in the present instance) with the pockets or receptacles *j j*, deeper than the groove, and containing supplies of oil in contact with which the rib *h* rotates, so that the continuous lubrication of the groove and rib is assured. The rod H passes through and is guided by a central stand K, secured to the table A, and projecting through a central opening in the chopping-block without being in contact therewith, the upper portion of the said stand being contained within a cover *k*, which is secured to the block, and which prevents particles of meat from escaping through the central opening of the same.

The cross-head, I, previously referred to, and shown in perspective in Fig. 4, is vertically adjustable on the rod H, and can be retained after adjustment by a set-screw *x*, the upper end of the rod being threaded for the reception of nuts, which resist the shocks imparted to the cross-head when the knives are brought into violent contact with the meat on the chopping-block.

The knives *d d* are adjustable independently of each other and of the said cross-head, so that the coincidence of the cutting-edge of each knife with the face of the chopping-block may always be assured.

I prefer to carry out this feature of my invention in the manner shown in Fig. 4, where it will be seen that two screw-rods *m m* rise vertically from the back of each knife and pass through lugs *n n* on the cross-head, each rod being furnished with two nuts, one above and the other below the lug through which it passes. The most accurate adjustment of the knives can be effected by the manipulation of these nuts.

A circular casing *p* is secured to the chopping-block, so as to form on the same a trough P for keeping the meat within proper bounds; and on the edge of the annular rib *h*, secured to the bottom of the block, are teeth for receiving those of a pinion *q*, which may be driven by the shaft D, through the medium of any suitable system of gearing, that shown in the drawing forming no part of my present invention.

This shaft D may be driven by a belt passing round the pulleys *s*, or it may be driven by hand from a shaft W, furnished at one end with a handle *t*, and at the other with a cog-wheel R, gearing into a pinion on the said shaft D.

A platform T may be hinged, as at *w*, to one edge of the table A, to support a vessel in which the chopped meat can be deposited. The means by which it may be supported, and the most convenient method of disposing of it when not in use, are shown in Fig. 1.

I am aware that prior to my invention meat-chopping machines have been made with vertically-reciprocating knives operating in conjunction with rotating chopping blocks. I therefore do not claim such a combination broadly; but

What I do claim as my invention, and desire to secure by letters patent, is—

1. The combination, in a meat-chopping machine, of a rotary choping-block having an annular rib, with a table having an annular recess and a pocket communicating with the said recess, all substantially as set forth.

2. In a meat-chopping machine, the combination of a rotary chopping-block with a reciprocating cross-head carrying knives, each of which is vertically adjustable on the said cross-head independently of the other, substantially as described.

3. The knife *d*, having two screw-rods, *m m*, attached to its back, substantially as shown, for the purpose specified.

4. The combination, in a meat-chopping machine, of the reciprocating rod, carrying the knives, the cross-head secured to the said rod, and having anti-friction rollers, with guides, adapted to the said rollers, all substantially as set forth.

WILLIAM WOODWORTH.

POUGHKEEPSIE, September 4, 1887.

Signed in the presence of

JETHRO WOOD,
OLIVER EVANS.

NOTE.—The specification including the claims must be in duplicate, and in addition a third copy of the claims alone must be furnished.

Form 10.

FOR AN ART OR PROCESS.

To all whom it may concern :—

Be it known that we, Marion Ellsworth, of Chicago, county of Cook, and state of Illinois, gentleman, and Joseph Richard Shaw, of Indianapolis, County of Marion, and State of Indiana, gentleman, have jointly invented a certain new and useful process of Treating Sludge Oil, in order to obtain from it a resinous substance, (for which we have obtained a patent in [here name the country], No. , bearing date 189 ,* of which the following is a specification :—

In purification of hydrocarbon oils produced by the distillation of crude petroleum, asphalts, or bitumens, or by the destructive distillation of coal, resins, or bituminous shales, the oils, are agitated with 2 per cent or more of concentrated sulphuric acid (60° Baumé, 1.86 specfic gravity), in order to remove certain oils contained in the distillate which would, in course of time, absorb oxygen from the air, and cause the oil to become dark-coloured and gummy, and also to remove tarry substances and the disagreeable odour. Sulphuric acid combines chemically with these bodies and dissolves them, forming a dark-red, heavy liquid, which settles on the bottom of the agitator, and can then be readily drawn off from the purified oil. This peculiar compound of sulphuric acid and hydrocarbon oils dissolved in the excess of acid, is known as 'sludge.' At present it is purchased by superphosphate manufacturers, who mix it with a little water, which decomposes the compound of acid and oil, producing a weaker acid (about 50° Baumé) used in the manufacture of superphosphate of lime, and a dark-coloured offensive oil, which rises to the surface of the acid, and usually is thrown away, no commercial use having been found for it. This waste product is called 'sludge oil.'

The mode of practicing our invention is as follows : In our process, when the sludge has been decomposed by the addition of water, the sludge oil is drawn off, and is then purified by repeated washings with water, until the acid remaining in it is removed. For this purpose equal volumes of water and sludge oil may be used ; but the washing can be affected by a less quantity of water. The acid remaining in the oil, if any, is then neutralized with quicklime or caustic soda. The purified oil has a strong and somewhat disagreeable odour, and contains about 10 per cent of volatile oils, which are converted into a hard resin with difficulty. To remove these volatile substances, the sludge oil thus purified is introduced into a still with the addition of from 2 to 4 per cent of caustic soda and about 2 per cent of the oxides of lead or manganese, to oxidize any sulphurous body which may be in the oil and combine with it, and steam is then blown through the oil, the oil being kept hot either by a fire under the still or by the use of steam heated to the required temperature (between 212° and 450° Fahrenheit). The action of the steam is continued until no more volatile oils are removed, usually from five to ten hours. The steam is then shut off, and the contents of the still allowed to settle, when a sediment of tarry impurities and soda subsides, from which the pure oil may be drawn off. The oil is then introduced into a still or tank, and oxidized by blowing currents of air through it, the oil being kept at a moderate temperature from 200° to 300° Fahrenheit), either by a slow fire under the still, or by a steam coil in the bottom of the tank, or by heating the air by a hot-blast oven to the proper temperature before it is blown through the oil, and the action of the air is continued until complete oxidation is effected, and a sample on cooling solidifies to a more or less hard resin.

The time required to effect the oxidation varies with the working temperature and with the extent of surface of oil brought in contact with the air. We may define it as between four and twelve days. The action of the air upon the oil is stopped when

* NOTE.—If no foreign patent has been obtained, the words in parenthesis may be omitted.

samples on cooling, taken from the contents of the still, are found to be of the proper degree of hardness and toughness for the particular purpose to which the product is to be applied, and after letting the contents of the still settle the hot resin is drawn off from the sediment of soda and impurities.

The action of the air may be accelerated by adding other oxidizing agents—for example, about 2 per cent of the oxides of lead or manganese, or about 2 per cent of the manganates of soda and potassa to the oil. These substances act either by giving up oxygen to the oil or by their presence inducing a combination of the oxygen and the hydrocarbon.

An inferior quality of resin may be produced by treating the washed sludge oil in a still with caustic soda and litharge (5 per cent soda to 1 to 2 per cent litharge) and blowing a current of air through it at about the temperature of 350° Fahrenheit, which at the same time oxidizes the oil and removes the more volatile portions, which are distilled off until it is converted into a resin, which, on cooling, becomes hard and brittle. This process last mentioned requires from two to six days, but the resin produced is darker in colour than that made by first treating with steam and then with air at a lower temperature, as the colouring matter is not affected by steam at 400°, while air at that temperature rapidly darkens it by oxidation. Sunlight bleaches the colour of sludge oil, and, at the same time, greatly accelerates the absorption of oxygen from the air. To produce the lightest-coloured resins the sludge oil is steamed with 5 per cent of a solution of soda, 20° Baumé, at a low temperature (about 200° to 250° Fahrenheit for ten hours), to remove the more volatile portions, and then oxidized and bleached by exposing the oil, in shallow tanks covered by glass, to the action of the sunlight, the oil being kept hot and fluid by a steam coil in the bottom of the tank, and currents of air blown through it to produce the oxidation.

Inferior qualities of sludge oil, as those produced in the purification of lubricating oils, and which contain a large quantity of tarry substances, are treated as follows: The oil is charged in to a still, and caustic soda and black oxide of manganese, in the proportion of about 5 per cent of soda and 2 per cent of manganese, are added, and the charge distilled by a current of steam blown through the oil, assisted by a fire under the still, until only tar and coke remain behind. The distillation commences at about 350° Fahrenheit, and, the fire being increased, the temperature in the still gradually rises to about 800°, when only the thick pitch remains in the still.

By the use of steam under pressure the oil can be distilled with scarcely any decomposition, and the distillate, which is of a yellow light-red colour, can be converted into a superior resin by oxidizing it with a current of hot air. The resin produced by this oxidation of sludge oil is distinguished from all other known resins and resinous substances by its behaviour with different chemicals and solvents. It varies in colour from yellow to dark garnet red, according to the method of its production. It is hard, brittle, and odourless at ordinary temperatures, tasteless, insoluble, and not acted upon by water, soda, potassa, and ammonia, even when heated.

Alcohol of 95 per cent dissolves but small quantities of this resin, even when boiled with it. Petroleum-naphtha dissolves it very quickly without the aid of heat, producing a varnish. Spirits of turpentine readily dissolves the melted resin, forming a varnish. Benzole, chloroform, and bisulphide of carbon all dissolve the resin, the solution being aided by warming. Ether and a mixture of ether and alcohol, in equal parts, quite readily dissolve it, but not so readily as pure ether. Linseed oil and olive oil dissolve the melted resin. A solution of the resin in linseed oil and spirits of turpentine forms an 'oil varnish.' Concentrated sulphuric acid dissolves it completely; the resin separates again on adding water. Nitric acid attacks it violently and converts it into a brown tarry or gummy substance, having a pleasant, peculiar odour. Hydrochloric acid seems to have little or no action on it.

It is well known that it has been proposed to use sludge oil as a paint oil, but this has not been attended with practical success. We do not wish to be understood, how-

ever, as making claim, broadly, to a process for freeing sludge oil from the acid by the use of water and caustic alkalies, or by still further purifying it by subjecting it to distillation, or by blowing steam through it, for the purpose of removing impurities, all of which, it is well known, have been practiced since the discovery of the present processes of refining petroleum. Nor do we wish to be understood as laying claim in this application to the resinous substance produced by my process, as that forms the subject-matter of another application by me for letters patent.

We claim—

1. The process herein described for producing from sludge oil a resinous substance possessing the properties described, which consists in combining the oxygen of the air with the sludge oil with the aid of a moderate degree of heat.

2. The process of producing from sludge oil a substance of a resinous character, which consists in treating the sludge oil while heated to a moderate temperature, with air and with other oxiding agents, substantially as described.

3. The process of treating sludge oil in order to obtain from it a resinous substance, which consists in purifying such oil, distilling from it the volatile substances present therein, heating the residue to a temperature of from 200° to 300° Fahrenheit, and blowing air into it while it is so heated, substantially as described.

MARION ELLSWORTH,
JOSEPH R. SHAW.

CHICAGO, September 1, 1887.
Signed in the presence of
MAURICE JONES, }
HENRY ELIAS. }

FORM 11.

FOR A COMPOSITION OF MATTERS.

To all whom it may concern :—

Be it known that I, Ebenezer Whitney, of the city of Charleston, in the District of Charleston and State of South Carolina, gentleman, am the administrator of the estate of Benjamin Browning in his lifetime of the said city, gentleman, and that the said Benjamin Browning did invent a certain new and useful Composition of Matter to be Used for the Removal of Hair and Grease from Hides preparatory to tanning, (for which I have obtained a patent in [here name the country], No. , dated , 189) * of which the following is a specification :

The composition of the said Benjamin Browning consists of the following ingredients, combined in the proportions stated, viz.:

Water substantially pure	500 gallons.
Unslacked lime	350 pounds.
Soda-ash (sodium carbonate)	100 "
Saltpetre (nitrate of an alkali metal)	29 "
Sulphur (preferable flowers of sulphur)	10 "

These ingredients are to be thoroughly mingled by agitation.

In using the above named composition the hides should first be freed from all salt and imprities, by soaking green hides one day and dry hides eight days. The hides so cleaned are then placed in the said solution, and allowed to remain in it forty-eight hours. They should then be removed from the solution and unhaired in the usual way.

By use of the above composition the hair is speedily and thoroughly loosened, and the hides, while retaining all that portion of the substance which can be converted

* NOTE.—If no foreign patent has been obtained, the words in parenthesis may be omitted.

into leather, are at the same time entirely cleaned from grease and other substances which would prevent them from being tanned quickly.

I am aware that a composition consisting of soda-ash, water, lime, and sulphur has been used for the same purpose, and that a patent therefor was granted to C. D., July 10, 18—, No.——. I am also aware that saltpetre has been used in depilatory processes; but I am not aware that all of the ingredients of my composition have been used together.

What I claim, and desire to secure by letters patent of the Dominion of Canada, is—

1. The herein-described composition of matter, consisting of water, unslacked lime, soda-ash, saltpetre, and sulphur, substantially as described and for the purpose specified.

2. The herein-described composition of matter for depilating and preparing hides for tanning, consisting of pure water, five hundred gallons, unslacked lime three hundred and fifty pounds, soda-ash, one hundred pounds, saltpetre twenty pounds, and flowers of sulphur ten pounds, substantially as described.

EBENEZER WHITNEY,
Administrator.

CHARLESTON, September 1, 1887.

Signed in the presence of
JOHN JAMES,
HENRY SMITH

OATHS.

NOTE.—Where oaths are made out of Canada, and before a judge, the seal of the court, presided over by such judge, should be affixed, and if before a notary public, his seal should be affixed to such oaths.

When the invention has been assigned before the issue of Patent the affidavit must be made by the 'inventor,' not by the 'assignee.'

If the inventor is dead, the administrator or executor will make the affidavit that the person named as inventor was the inventor.

FORM 12

BY SOLE INVENTOR FOR HIMSELF.

CANADA,
PROVINCE OF ONTARIO,
County of York.

I, John Smith, of the city of Toronto, in the County of York, in the Province of Ontario, carpenter, make oath and say, that I verily believe that I am the inventor of the new and useful improvements in Machines for Breaking Stone, described and claimed in the specification relating thereto, and for which I solicit a Patent by my petition, dated 1st of September, 1887. And I further say that the same has not been patented to me, or to others with my knowledge or consent, except in the following countries.* And I further say that the several allegations contained in the said petition are respectively true and correct.

JOHN SMITH,

Sworn before me, at the city of Toronto, the first day of September, 1887.

THOMAS BROWN,
J. P. for the County of York.

FORM 13.

JOINT INVENTORS.

CANADA,
PROVINCE OF ONTARIO,
County of Carleton.

We, James Thomas, of the city of Ottawa, in the County of Carleton, in the Province of Ontario, in the Dominion of Canada, blacksmith, and George Robert Major, of the same place, tinsmith, do hereby severally make oath and say :

1st. I, this deponent, James Thomas, for myself do hereby make oath and say that I verily believe that I and the said George Robert Major are the inventors of the new and useful improvement in the art or process of separating smut from wheat, described and claimed in the specification in duplciate relating thereto, for which we solicit a Patent by our petition to the Commissioner of Patents, dated first September, 1887. And I further say that the several allegations contained in the said petition are respectively true and correct.

2nd. I, this deponent, George Robert Major, for myself do hereby make oath and say, that I verily believe that I and the above named James Thomas are the inventors of the new and useful improvement in the art or process of separating smut from wheat, described and claimed in the specification in duplicate, relating thereto, for which we solicit a Patent by our petition to the Commissioner of Patents, dated first September, 1887 ; and I further say that the several allegations contained in the said petition are respectively true and correct.

JAMES THOMAS,
GEORGE ROBERT MAJOR.

Sworn before me, by the said James Thomas and George Robert Major, the first day of September, 1887, at the city of Ottawa.

JOHN SMITH,
J. P. for the County of Carleton.

* Here insert, if previously patented, the country or countries in which it has been so patented, giving the date and number of each patent. If not previously patented, erase the words "except in the following countries" and insert the words "in any country." This foot note also refers to Form 18, 19 and 20.

FORM 14.

FOR A RE-ISSUE (INVENTOR).

CANADA,
PROVINCE OF ONTARIO,
County of Carleton,

I, Thomas Brown, of the city of Ottawa, in the Province of Ontario, lumber manufacturer, make oath and say that the several allegations contained in my petition to the Commissioner of Patents, dated 1st of September, 1887, for a re-issue of the Patent granted to me on the 4th of September, 1886, for a new and useful improvement in churns, are respectively true and correct ;

That I am the sole owner of the said Patent ;

And that I am the inventor of the improvement set forth and claimed in the amended specification in duplicate relating thereto.

THOMAS BROWN.

Sworn before me, at the city of Ottawa, in the County of Carleton, in the Province of Ontario, this first day of September, 1887.

WILLIAM MILLS,
J. P. for the County of Carleton.

NOTE.—If the patent has not been exclusively assigned, the affidavit must state that the application for re-issue is made with the consent of the assignees.

NOTE.—See foot-note on preceding page.

FORM 15.

FOR A RE-ISSUE (ASSIGNEE OF THE ENTIRE INTEREST).

CANADA
PROVINCE OF ONTARIO,
County of Carleton.

I, David Lane, of the town of Cobourg, in the County of Northumberland, Province of Ontario, tanner, make oath and say that the several allegations contained in my petition to the Commissioner of Patents, dated 1st September, 1887, for a re-issue of the Patent granted to Thomas Tardy, of the city of Ottawa, Province of Ontario, broom maker, for new and useful improvements in planing machines, are respectively true and correct ;

That I am the sole owner of the said Patent ;

And that Thomas Tardy was the inventor of the improvements set forth and claimed in the amended specification in duplicate relating thereto.

DAVID LANE.

Sworn before me, at the town of Cobourg, in the County of Northumberland, Province of Ontario, this first day of September, 1887.

THOMAS PARSONS,
J. P. for the County of Northumberland.

FORM 16.

PETITION FOR CAVEAT.

To the Commissioner of Patents, Ottawa :

The undersigned, James Thompson, of New Edinburgh, in the County of Russell, in the Province of Ontario, school teacher, an intending applicant for a Patent, who has made certain new and useful improvements in locomotive engines, and has not perfected his inventon, prays that his specification may be filed as a *Caveat* in the Patent Office. (Here describe the invention as far as possible, and refer to letters in drawing, as in specification given before in Form No. 13.)

JAMES THOMPSON.

FORM 17.

OATH FOR CAVEAT.

CANADA,
PROVINCE OF ONTARIO,
County of Russell,

I, James Thompson, of New Edinburgh, in the County of Russell, Province of Ontario, school teacher, make oath and say that I am the inventor of the invention described in the foregoing specification, and that the allegations contained therein are respectively true and correct.

JAMES THOMPSON.

Sworn before me, at New Edinburgh, the first day of September, 1887.

ALEXANDER BUSH,
J. P. for the County of Russell.

ASSIGNMENTS.

FORM 18.

OF AN ENTIRE INTEREST (OR AN UNDIVIDED ONE-HALF INTEREST) IN AN INVENTION BEFORE THE ISSUE OF PATENT.

In consideration of the sum of ten dollars, to me paid by Solomon Lang, of the city of Montreal, I do hereby sell and assign to the said Solomon Lang all (or an undivided half of all) my right, title and interest in and to my invention for new and useful improvements in planing machines, as fully set forth and described in the specification which I have signed preparatory to obtaining a Patent; and I do hereby authorize and request the Commissioner of Patents, to issue the said patent to the said Solomon Lang (or jointly to myself and the said Solomon Lang) in accordance with this assignment.

Witness my hand and seal this first day of September, 1887, at the city of Montreal.

THOMAS LORD. [L.S.]

FORM 19.

OF AN ENTIRE INTEREST IN A PATENT.

In consideration of five hundred dollars, to me paid by Nathan Wilcox, of Keokuk, Iowa, I do hereby sell and assign to the said Nathan Wilcox, all my right, title and interest in and to the Patent of Canada, No. 23,460, for an improvement in locomotive head lights, granted to me July 30, 1878, the same to be held by and enjoyed by the said Nathan Wilcox to the full end of the term for which said Patent is granted, as fully and entirely as the same could have been held and enjoyed by me if this assignment and sale had not been made.

Witness my hand and seal this first day of September, 1887, at Keokuk, Iowa.

HORACE KIMBALL. [L.S.]

FORM 20.

DISCLAIMER.

(To be in duplicate.)

I, William Lookup, of the city of Hull, in the County of Ottawa, in the Province of Quebec, having on the 1st September, 1887, obtained a Patent for the Dominion of Canada, for new and useful improvements in wagon brakes ;

And through mistake, accident or inadvertence, without any wilful intent to defraud or mislead the public, I have made the claim in my specification too broad (or as being the inventor of a material or substantial part of the invention patented of which I was not the inventor, and to which I had no legal right) :

I, therefore, hereby disclaim the part of the claim in the specification, which is in the following words :

'I also claim the use of the lever A, in combination with crank D, as described.'

WILLIAM LOOKUP.

HULL, September 30, 1887.

Signed in duplicate in the presence of

DAVID BROWN,
FRANCIS LEMIEUX.

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PUBLIC HEALTH.

HEALTH OF ANIMALS.

MISCELLANEOUS.

APPENDIX TO THE REPORT OF THE MINISTER OF AGRICULTURE

EXPERIMENTAL FARMS

REPORTS

OF THE

DIRECTOR	WM. SAUNDERS, LL.D.
AGRICULTURIST	J. H. GRISDALE, B. AGR.
HORTICULTURIST	W. T. MACOUN
CHEMIST	F. T. SHUTT, M.A.
ENTOMOLOGIST AND BOTANIST	JAS. FLETCHER, LL.D.
EXPERIMENTALIST	C. E. SAUNDERS, PH. D.
POULTRY MANAGER	A. G. GILBERT
SUPT. EXPERIMENTAL FARM, NAPPAN, N.S.	R. ROBERTSON
HORTICULTURIST " " "	W. S. BLAIR
SUPT. EXPERIMENTAL FARM, BRANDON, MAN.	S. A. BEDFORD
" " " INDIAN HEAD, N.W.T.	ANGUS MACKAY
" " " AGASSIZ, B.C.	THOS. A. SHARPE

FOR

1904

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OTTAWA
PRINTED BY S. E. DAWSON, PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1905

[No. 16—1905.]

APPENDIX

TO THE

REPORT OF THE MINISTER OF AGRICULTURE

ON

EXPERIMENTAL FARMS

OTTAWA, December 1, 1904.

SIR,—I beg to submit for your approval the eighteenth annual report of the work done, and in progress, at the several experimental farms.

In addition to my report, you will find appended reports from the following officers of the Central Experimental Farm : From the Agriculturist, Mr. J. H. Grisdale; from the Horticulturist, Mr. W. T. Macoun ; from the Chemist, Mr. Frank T. Shutt ; from the Entomologist and Botanist, Dr. James Fletcher; from the Experimentalist, Dr. C. E. Saunders, and from the Poultry Manager, Mr. A. G. Gilbert.

From the Branch Experimental Farms there are reports from Mr. R. Robertson, Superintendent, and from Mr. W. S. Blair, Horticulturist of the Experimental Farm for the Maritime Provinces, at Nappan, Nova Scotia; from Mr. S. A. Bedford, Superintendent of the Experimental Farm for Manitoba, at Brandon; from Mr. Angus Mackay, Superintendent of the Experimental Farm for the North-west Territories, at Indian Head, and from Mr. Thomas A. Sharpe, Superintendent of the Experimental Farm for British Columbia, at Agassiz.

In these reports there will be found the results of many important and carefully conducted experiments in agriculture, horticulture and arboriculture, the outcome of practical and scientific work in the fields, barns, dairy and poultry buildings; the orchards and plantations at the several experimental farms; also of scientific research in connection with the breeding of cereals and in determining their relative value, also of research work in the chemical laboratories bearing on many branches of agricultural and horticultural employment and of information gained from the careful study of the life histories and habits of injurious insects and the methods by which noxious weeds are propagated and spread, together with the most practical and economical measures for their destruction. In the report of the Entomologist and Botanist will

also be found particulars of the experiments and observations which have been made during the past year in connection with the Apiary.

The large and constantly increasing demand by the farmers of the Dominion for the publications issued from the experimental farms, the rapidly extending correspondence and the readiness shown by farmers everywhere to co-operate with the work of the farms in the testing of new and promising varieties of cereals furnish gratifying evidence of the desire for information and improvement among this class of the community, also of the high esteem in which the work of the farms is held. It is hoped that the facts brought together in the present issue will be found of much practical value to the Canadian farmer and fruit-grower, and that they may assist in advancing agriculture and horticulture in this country.

I have the honour to be, sir,
Your obedient servant,

WM. SAUNDERS,
Director of Experimental Farms.

To the Honourable
The Minister of Agriculture,
Ottawa.

ANNUAL REPORT

OF THE

EXPERIMENTAL FARMS

REPORT OF THE DIRECTOR, WM. SAUNDERS, LL.D., F.R.S.C., F.L.S.

The general results of farm work throughout the Dominion, although not so uniformly favourable as in some other years, have on the whole been fairly satisfactory. The lengthened drought which prevailed in the Maritime Provinces during June and the greater part of July, reduced the hay crop considerably, leaving it from 20 to 30 per cent below the average. The grain, also, in most districts for the same reason gave lighter crops than usual, while pastures were seriously injured. In Quebec and Ontario the general conditions have been more favourable. The season, however, was cooler than usual, and although the rainfall in most places was sufficient, the crops did not make rapid growth. Owing to the severe winter, the fall wheat in Western Ontario was much injured, and nearly one-fourth of the crop was ploughed up. The average yield of that harvested was considerably below the average of past years. Spring wheat gave a yield about equal to the average, while barley and oats gave excellent crops, considerably above the average returns. In hay, also, the crop was well above the average.

In Manitoba the spring opened late; otherwise the season was favourable. Farmers have, however, suffered from an unusual invasion of rust, which reduced the crops of wheat and oats in some districts, but this was not sufficiently general to materially affect the total crop, and the high price paid for wheat this year, together with the increased area under crop will probably more than make up for any loss from rust. In the Territories seeding was also late, with favourable weather until the middle of June, when a period of drought set in which continued until the middle of July. Then timely rains saved the grain from injury, but the straw was considerably shorter than usual. The wheat crop in the Territories will probably average higher than in Manitoba, and the largely increased area there, together with the high prices realized, should materially assist in placing Territorial farmers in a very prosperous condition. The acreage now prepared for grain next season is much larger than in 1903, both in Manitoba and the Territories, and the prospects for the future are bright.

In the coast climate of British Columbia the rainfall in May, June and part of July was less than usual, but crops did not materially suffer. In the interior districts, where the rainfall is always light, the shortage this season reduced the grain yield in many localities below the average of past years.

In carrying on the work of the Experimental Farms from year to year, persistent efforts are made to assist farmers with information in regard to the maintenance of the fertility of their land, its proper treatment, and in the selection of highly productive seed of best quality; also to aid them generally in their endeavours to overcome difficulties which present themselves from time to time in the carrying on of

farm work. These efforts have been much appreciated. The mass of new facts bearing on agriculture contained in this eighteenth annual report gives evidence of the skill and assiduity of the officers composing the staff of the Experimental Farms, and of their untiring efforts to benefit the cause of agriculture. At all these institutions visiting farmers are always welcome, and those who have an opportunity of personally inspecting the work in progress, after seeing its extent and its practical character, usually leave with a higher regard for the farms than they had before. Those who are unable to visit any of the farms can obtain, for the asking, the annual reports, in which the experiences gained at all the Experimental Farms are given, the perusal of which will give the reader, wherever he may be located, much information of practical value. Bulletins also are issued from time to time on special subjects, and are supplied free in the same manner as the reports.

THE BREEDING OF CROSS-BRED APPLES FOR THE CANADIAN NORTH-WEST.

As soon as the branch experimental farms were established in the Canadian North-west experiments were begun on a rather extensive scale with both large and small fruits, with the object of finding out what sorts could be successfully grown there. Hardy varieties of the apple received special attention on account of the general usefulness of this fruit, and of its importance as a healthful article of diet. During the first eight or ten years more than two hundred of the hardiest sorts of cultivated apples obtainable in northern Europe and other northern countries were thoroughly tested, both at Brandon and Indian Head. These were planted in considerable numbers, often from twenty to fifty trees of a kind, in shelter of different degrees and without shelter, but none of these have yet produced a single apple. Experiments are still being continued with such new varieties as are announced from time to time as specially hardy, and thus far with similar negative results.

In 1887, the year during which work on the Experimental Farms was begun, seed was obtained from the Imperial Botanic Gardens at St. Petersburg, Russia, of a small wild Siberian crab-apple known as the 'Berried Crab,' *Pyrus baccata*. This wild crab is said to grow in great abundance near the shores of the Baikal Sea, and in other parts of Northern Siberia. Young trees were raised from this seed, and some of them were sent to Brandon, Man., and some to Indian Head, N.W.T., and at both places they were found to be entirely hardy. During a trial of fourteen or fifteen years the 'Berried Crab,' has never been injured by winter, and the trees have started from the terminal buds on the branches every season. These trees have fruited abundantly for many years, but the fruit is small—not much larger than a cherry—astringent and acid, and sometimes bitter. It does, however, make excellent jelly, hence this fruit in its unimproved form is found useful. It is also highly ornamental when covered with blossom in the spring, or with its fruit in the autumn. The trees are rather dwarf in habit, low branched and strongly built, with the fruit very firmly attached to the tree. From their build and general character they are well adapted to resist the winds to which trees are exposed on the North-west plains.

BEGINNING OF THE WORK OF CROSS-BREEDING.

After four or five years' experience had thoroughly established the character of this tree for extreme hardiness, efforts were made to improve the size and quality of the fruit by cross-fertilizing the flowers of *Pyrus baccata* with pollen from many of the hardiest and best sorts of apples grown in Ontario. This work was begun in 1894, and has since been continued along several different lines. The seeds obtained from the first crosses were sown in the autumn of that year and germinated the following spring producing in all about 100 thrifty young trees. These were planted in the spring of 1896. Many of them grew very rapidly, and soon made shapely specimens. The

young trees resulting from subsequent experiments have been planted from year to year in orchards at Ottawa, Brandon and Indian Head. In 1899 thirty-six of the cross-bred apples first produced and grown at Ottawa fruited, and five of them were of such size and quality as to justify their being propagated for more general test. The fact that so many of these fruited on the fourth year from the sowing of the seed indicates a very early bearing habit. Since then about two hundred more of these cross-bred apples have borne fruit, and the number of varieties worthy of extended cultivation has been considerably increased. Root grafts of some of the more promising sorts were early made, and these have been tested some three or four years at each of the North-western Experimental Farms, and have shown no indications of tenderness, even when planted in exposed situations. The cross-bred sorts grafted on the roots of *Pyrus baccata* have produced trees which so far as they have been tried seem to be quite as hardy as the wild form of *baccata,* and there is every reason to expect that they will prove generally hardy throughout the North-west country.

EXPERIMENTS WITH 'PYRUS PRUNIFOLIA.'

In 1896 a series of crosses was begun on another sort of wild crab known as *Pyrus prunifolia.* This is regarded by some authorities as a distinct species; by others it is believed to be a hybrid between *P. malus,* the wild crab of Europe, and *P. baccata.* Seeds of this form were also obtained from the Royal Botanic Gardens of St. Petersburg, Russia. The fruit of *P. prunifolia* is usually larger than that of *baccata,* and will average nearly double the size. Its hardiness in the North-west has also been established by a test covering a number of years on both of the Experimental Farms, at Brandon and Indian Head. The first crosses with this species were made in 1896, and since then many new sorts have been originated.

APPLES FROM WHICH POLLEN WAS USED.

In the first crosses made on *Pyrus baccata* in 1894, pollen was used from the Tetofsky, Duchess and Wealthy apples, but since then pollen has been obtained from many other varieties of apples and used on *P. baccata, P. prunifolia,* or both, including Anis, Beautiful Arcade, Broad Green, Excelsior, Fameuse, Golden Russet, Haas, Herren, Krimskoe, McIntosh Red, McMahon White, Osimoe, Pewaukee, Red Astrachan, Ribston Pippin, Scott's Winter, Simbirsk No. 9, Swayzie Pomme Gris, Talman's Sweet, Winter St. Lawrence and Yellow Transparent. The number and variety of the crosses have thus been very much increased.

About 800 of these cross-bred varieties have been produced, and between 200 and 300 have fruited. While a large number have produced fruit of inferior quality, there have been obtained up to the present time 20 varieties in all, which from their superior size and quality may be regarded as useful for domestic purposes, and deserving of more extended trial.

VARIETIES PRODUCED.

On plate I there are shown figures of *Pyrus baccata* (No. 1), and eight of the new cross-bred sorts of natural size, all produced from this species. The relative increase in the size of the cross-bred sorts is manifest to the eye. On weighing good average samples we find that the larger of these cross-bred apples are from 12 to 14 times heavier than *P. baccata.*

2. Alberta. *Pyrus baccata* with Haas.—Tree a strong grower and an abundant bearer. Fruit size 1·6 inches across, 1·4 inches deep, round somewhat flattened and slightly ribbed. Calyx persistent. Stem about half an inch long. Colour greenish yellow with a bright red cheek. Flesh nearly white, juicy, slightly astringent (astrin-

gency scarcely perceptible when fruit is ripe). Quality fair to good. Season last week in September to middle of October.

3. Silvia. *P. baccata* with Yellow Transparent.— Tree a strong grower and fair bearer. Fruit, size 1·4 inches across, 1·5 inches deep, form somewhat pointed and ribbed. Calyx persistent. Stem ¾ to ½ inch long. Colour pale yellow. Flesh of pleasant flavour, subacid, no astringency. Quality good. Ripe August 9 or 10, the earliest to ripen of all the cross-bred apples yet fruited.

4. Tony. *P. baccata* with McMahon White. Tree a strong grower and a heavy bearer. Fruit, size 1·6 inches across and 1·4 inches deep. Form round, somewhat flattened. Calyx persistent. Stem about ·8 of an inch long. Colour greenish yellow, streaked and splashed with bright red, and with many yellowish dots. Flesh yellowish white, juicy, sprightly, subacid, slightly astringent, with a pleasant flavour. Quality good. Season late September and October. A group of specimens of this variety is shown on plate II.

5. Columbia. *P. baccata* with Broad Green.—Tree a very strong grower and a fair bearer. Fruit, size 1·8 inches across and 1·6 inches deep, somewhat conical, distinctly ribbed. Calyx protruding and persistent. Stem of medium length. Colour red with stripes and dots of a deeper shade. Flesh yellowish, lightly streaked with red, juicy, subacid with a pleasant flavour, slightly astringent. Season late September and October.

6. Elsa. *P. baccata* with Yellow Transparent.—Tree a strong grower and good bearer. Fruit, size 1·4 inches across and 1·3 inches deep; nearly round, slightly ribbed. Calyx persistent on a slightly raised eminence, ribbed. Stem about an inch long, slender, but strong. Colour bright yellow. Flesh fine grained, tender, juicy, rather acid, but of pleasant flavour. Quality good. Season latter part of August.

7. Prince. *P. baccata* with Tetofsky.—Tree a strong grower and very productive. Fruit, size 1·6 inches across and 1·3 inches deep, nearly round. Calyx drops in many of the specimens. Stem 1 to 1½ inches in length. Colour bright red (of a deeper shade on the side exposed to the sun), with a few paler dots and streaks. Flesh nearly white, juicy, subacid, somewhat astringent (astringency lessens as the fruit ripens). Of a pleasant flavour. Ripe early in Setpember.

8. Jewel. *P. baccata* with Yellow Transparent.—Tree a strong grower and a good bearer. Fruit, size, 1·4 inches across and 1·3 inches deep, nearly round, slightly elongated. Calyx persistent, stem about 1¼ inches long. Colour yellowish, with a pale red cheek. Flesh moderately firm, crisp, juicy, of good flavour, subacid with very little astringency. Quality good. Season, last week in August and early in September.

9. Robin. *P. baccata* with Simbirsk No. 9.—Tree a good grower and a medium bearer. Fruit, size, 1·5 inches across and 1·4 inches deep; nearly round, strongly ribbed. Calyx large, persistent and projecting. Stem about 1 inch long. Colour, yellow and red. Flesh very firm, juicy, subacid with a slight astringency and a pleasant flavour. Quality good, one of the best. Season, latter part of August and September.

10. Charles. *P. baccata* with Tetofsky.—Tree a very upright and strong grower, with large leathery leaves, and a medium bearer. Fruit, size, 1·6 inches across and 1·5 inches deep; nearly round, slightly ribbed. Calyx persistent. Stem rather long. Colour a uniform yellow. Flesh yellowish, solid, crisp, juicy, with a pleasant flavour, mildly acid and slightly astringent. Season, early in September.

11. Novelty. *P. baccata* with Wealthy.—Tree a vigorous grower with good foliage and fairly productive. Fruit, size, 1·6 inches across and 1·3 inches deep; nearly round, somewhat flattened at each end. Calyx persistent. Stem long and slender. Colour

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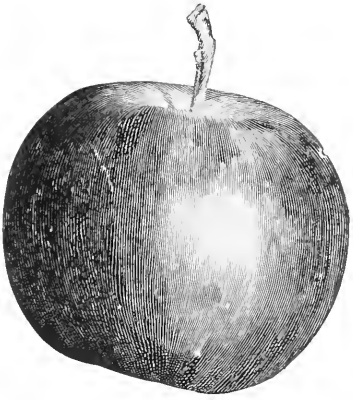

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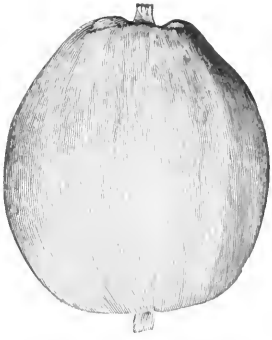

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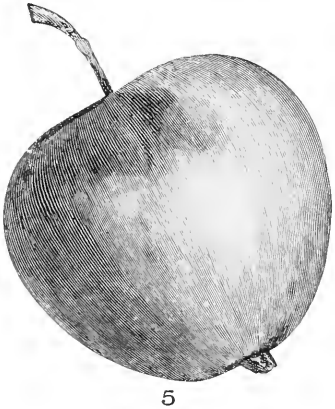

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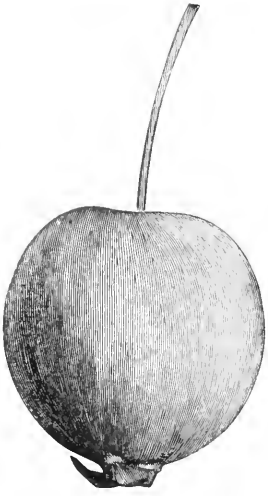

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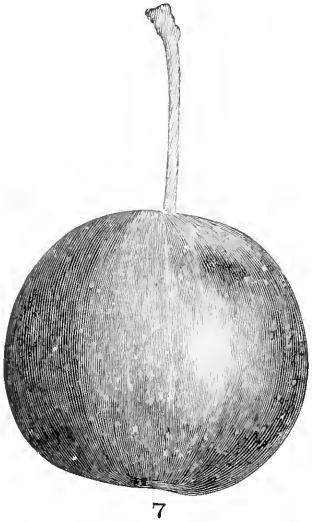

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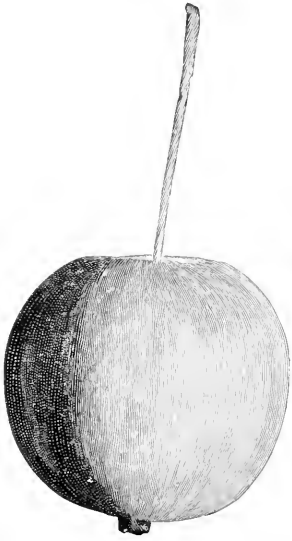

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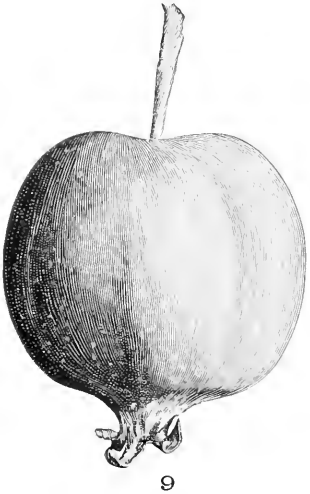


9

1.—Pyrus Baccata.
2.—Alberta.
3.—Silvia.

4.—Tony.
5.—Columbia.
6.—Elsa.

7.—Prince.
8.—Jewel.
9.—Robin.

deep red. Flesh a pale yellowish pink, firm, crisp, juicy, subacid and of fair quality. Season, middle to end of September.

12. Progress. *P. baccata* with Wealthy.—Tree a vigorous grower, fairly upright in habit and productive. Fruit, size, 1·4 inches across and 1·2 inches deep; nearly round, somewhat flattened at each end. Calyx persistent. Stem long and slender. Colour, red with some yellow and a dark red cheek. Flesh very firm, crisp, sub-acid, juicy, very slightly astringent and of fair flavour. Season, middle of September.

13. Aurora. *P. baccata* with Tetofsky.—Tree a fair grower and productive. Fruit, size, 1·5 inches across and 1·2 inches deep; nearly round, somewhat ribbed. Calyx persistent. Stem long. Colour, bright red almost all over. Very handsome. Flesh crisp, juicy, acid and of fair flavour. Astringency very slight. Ripe September 6 to 12.

14. Dawn. *P. prunifolia* with Simbirsk No. 9.—Tree a good grower and fairly productive. Fruit, size, 1·8 inches across and 1·6 inches deep. Calyx persistent. Stem about half an inch long. Colour, red, of a deeper shade on the sunny side. Flesh firm, white, juicy, distinctly sub-acid, with a pleasant flavour. Quality good. Ripe September 20 to 30.

15. Magnus. *P. prunifolia* with Simbirsk No. 9.—Tree a strong grower and a fair bearer. Fruit, size, 1·8 inches across and 1·7 inches deep; nearly round. Calyx persistent. Stem about half an inch long. Colour, orange and scarlet. Flesh firm, rather juicy but not crisp, subacid. Flavour aromatic, very slight astringent. Quality very good. One of the largest and best yet fruited of the cross-bred apples. Ripe September 20 to 30.

16. Manitou. *P. baccata* with McMahon White.—Tree a fair grower and productive. Fruit, size, 1·5 inches across and 1·2 inches deep; nearly round, distinctly ribbed. Calyx persistent, prominent, ribbed. Stem 1 to 1¼ inches long. Colour yellow, almost covered with bright red, becoming deep red where exposed to the sun. Flesh nearly white, juicy, sprightly, subacid, with a pleasant flavour. Quality fair. Ripe, end of September.

17. Pioneer. *P. baccata* with Tetofsky.—Tree a strong grower and a good bearer. Fruit, size, 1·5 inches across and 1·3 inches deep; nearly round, slightly ribbed. Calyx persistent. Stem rather long. Colour, yellow with a pink cheek. Flesh white, fine-grained, firm, crisp, subacid, slightly astringent, moderately juicy, with a pleasant flavour. Season latter part of September and October.

18. Golden. *P. prunifolia* with Golden Russet.—Tree a fair grower, and quite productive. Fruit, size 1·5 inches across, 1·2 inches deep, round, somewhat flattened at the ends. Calyx persistent, in a shallow basin. Stem ½ inch long, rather stout. Colour bright yellow. Flesh fairly juicy, rather sweet, very slightly astringent. Quality good. Season last week in August and September.

19. Bow. *P. baccata* with Pewaukee.—Tree a fairly strong grower and productive. Fruit, size 1·5 inches across and 1·2 inches deep. Calyx persistent. Stem rather long. Colour bright yellow, with a faint tinge of red. Flesh yellowish white, crisp, juicy, mildly subacid, not astringent, of good flavour. Season late in September.

20. Kent. *P. baccata* with McIntosh Red.—Tree a good grower and productive. Fruit 1·5 inches across and 1·3 inches deep, nearly round and ribbed about the calyx. Calyx persistent, and slightly projecting stem ¾ to 1 inch long. Colour deep red, with an orange shade deeper in tint on the sunny side. Flesh yellowish white, juicy, crisp, mildly subacid, slightly astringent and of fairly good flavour. Season end of September to December. A group of specimens of this variety is shown on plate II.

SUITABLE STOCKS FOR GRAFTING.

To ensure hardiness in a fruit tree not only must the part exposed to the air be capable of enduring the cold weather of winter, but the root on which the variety is grafted must be equally hardy, otherwise the tree will often perish at the root while the wood above ground is plump and free from injury. Fortunately we have in this instance in the roots of the wild form of *Pyrus baccata* a safe basis on which to work, and all of the young trees of the cross-bred apples which have been sent out for test from the Central Experimental Farm have been grafted or budded on this species. Some partial failures have occurred in grafting on this stock which have interfered with rapid distribution, and experience has shown that budding is to be preferred as a method of propagation in this instance. Having at the outset only one small tree to work with the number of grafts available must necessarily be limited, while probably three times the number of buds may be got from the same amount of wood. Not only does budding form a better union with the stock, but it also admits of the trees being multiplied more rapidly.

METHODS OF DISTRIBUTION OF THESE CROSS-BRED FRUITS FOR FURTHER TEST.

Supplies of all these different sorts are sent first to the Experimental Farms at Brandon and Indian Head, where orchards of considerable size are being established. These fruits are also being tested at many different points in Manitoba and the North-west Territories, and at a few places in northern Ontario. To determine their hardiness on the North-west plains it is essential that they be tried in many localities from the eastern boundaries of the plains, where the altitude is comparatively low, to the foothills of the Rocky Mountains, where the elevation above sea-level is much greater. The question of altitude has a most important bearing on the hardiness of fruit trees.

For several years a list has been in course of preparation, on which have been entered from time to time the names of settlers who take a special interest in the growing of trees and shrubs. From this list a number of names were chosen, distributed over a wide area, seldom taking more than one or two in each district. In this way about 200 locations were selected, the extreme points of variation in elevation ranging from 740 to 4,200 feet. Having corresponded with these parties and received assurance that any young trees sent them would be carefully looked after, the first distribution was made in 1902, when four one-year old trees (one tree each of four different sorts) were sent to each person. In the spring of 1903 a second package was sent to the same individuals containing two additional varieties of cross-bred apples, so that at each of these points six of these young trees have been received. Reports have come in from all those who have received the trees, and in almost every instance they are reported as entirely hardy, having stood the winters to which they have been exposed without injury, and as a rule made rapid growth. It is scarcely probable that any of these young trees will fruit in 1905, but in the following year it is likely that many of them will bear apples, when the interest in this work will be very much increased.

OTHER LINES OF WORK UNDERTAKEN.

Another line of work in producing new apples was begun two years ago in crossing *Pyrus malus*, the wild apple of Europe, with some of our best apples. This fruit is about an inch in diameter to start with and of fair quality. A hardy form of this tree has been secured, which has stood several winters at Brandon and Indian Head without injury; and with this during the past two seasons a number of crosses have been made.

Many of the best of the crosses produced on *P. baccata* and *P. prunifolia* have been recrossed, thus introducing a second quota of the blood of the larger apple.. with

the hope of obtaining fruits of larger size. How far this can be carried without inducing tenderness can only be determined by experiment. The first one-year old trees produced by this method were planted in the orchard at Ottawa in the spring of 1904.

A very large number of young trees has been raised within the past five years from seed saved from the best of the named cross-bred sorts, and this work is being rapidly extended. Many hundreds of these seedlings have been planted, chiefly in orchards on the western Experimental Farms. Some of these have already fruited, and among them several new sorts of promise have appeared. In raising trees from the seeds of these cross-breds, a large proportion of them will probably sport towards the female parent, *P. baccata*, and produce fruit of an inferior quality, while a small proportion will be likely to inherit more fully the qualities of the male, which would result in larger and better fruit. What proportion will show improvement in this direction can only be determined by growing them, but if only one good variety in a considerable number be had, the inferior ones can all be grafted with the good variety, and time thus saved in building up an orchard.

Many seedlings have also been raised of the Martha, Snyder and other crabs, and several of the seedlings of Martha grown at the Experimental Farm at Brandon have borne fruit of good size and quality, and have thus far been quite hardy.

Of these seedlings, Maggie and No. 309 are among the most promising, and these are being propagated for more extended trial. Including the products from all these different methods of working there are now more than 700 different sorts growing on the Experimental Farm at Ottawa, about 1,200 on the farm at Brandon, and about 650 at Indian Head. There are also the 1,200 trees which have been referred to as growing at 200 different localities in the North-west country.

Grafts of a number of these new seedlings have been sent to some of the leading nurseries in Canada and the opportunity thus afforded of growing stock to meet such demand for these fruits as may arise.

The lines of work in progress may be thus summarized :—

1. The producing of a large number of hybrids by crossing *P. baccata* and *P. prunifolia* with a large number of the best sorts of cultivated apples.

2. The carrying on of similar work with a hardy strain of *Pyrus malus*, the wild crab of Europe.

3. The growing of a large number of trees from seed obtained from the best of the named cross-bred sorts.

4. The producing of a series of second crosses by which the best of the first produced cross-breds will receive another portion of the blood of the larger fruits.

5. The careful testing of every new seedling, or cross-bred fruit, from any and every source, where, associated with acceptable size and quality, there is promise of hardiness.

By persevering along the lines indicated there is little doubt that within a very few years a number of varieties of apples will be available, possessing that hardiness, size and quality which will commend them to the settlers in all those portions of the northern country where ordinary apples under average conditions cannot be grown. The success thus far achieved is most encouraging, and doubtless greater triumphs in the future will reward persistent effort.

CO-OPERATIVE EXPERIMENTS BY CANADIAN FARMERS.

The assistance rendered to Canadian farmers by the distribution of samples of seed of high quality for the improvement of crops has been continued, and the work

highly appreciated. Farmers everywhere have gladly undertaken to co-operate with the Experimental Farms in the endeavour to ascertain the relative merits in earliness, productiveness and quality of the different varieties under trial, when grown under the different climatic conditions which prevail in the several provinces and territories of the Dominion. During 1904 more than 37,000 farmers joined in these co-operative tests. A large number of reports have been received in which many have expressed their gratitude for the efforts made in their behalf, and their appreciation of the great value of this work. The samples of wheat and barley sent to each applicant have weighed five pounds each, and those of oats four pounds, sufficient in each case to sow one-twentieth of an acre. The samples of Indian corn, pease and potatoes have weighed three pounds each.

The samples sent from the Central Experimental Farm during the early months of 1904 have been distributed as follows :—

DISTRIBUTION BY PROVINCES.

Name of Grain.	Prince Edward Island.	Nova Scotia.	New Brunswick.	Quebec.	Ontario.	Manitoba.	North-west Territories.	British Columbia.
Oats	603	1,350	1,319	3,316	2,212	891	1,395	135
Barley	136	514	297	1,201	893	334	549	66
Wheat	395	795	908	1,711	790	977	1,658	82
Pease	23	121	140	328	94	54	67	19
Indian corn	46	189	175	831	687	47	158	26
Potatoes	116	620	748	1,574	2,155	760	1,124	202
Total	1,319	3,589	3,587	8,961	6,831	3,063	4,942	530

Total number of samples distributed, 32,822.

Number of applicants supplied, 32,756.

Total number of packages of each sort distributed :—

Oats	11,221
Barley	3,981
Wheat	7,316
Pease	846
Indian corn	2,159
Potatoes	7,299
Total	32,822

The following list shows the number of packages which have been sent out of the different varieties :—

Name of Variety.	Number of Packages.
Oats.	
Banner	2,765
Improved Ligowo	1,976
Tartar King	1,828
Waverley	1,328
Wide Awake	897
Goldfinder	759
Abundance	679
Thousand Dollar	504
Black Beauty	333
American Beauty	242
Total	11,221
Barley (Six-rowed).	
Mensury	1,228
Odessa	686
Mansfield	218
Claude	171
Rennie's Improved	162
Royal	44
(Two-rowed).	
Sidney	553
Canadian Thorpe	333
Standwell	333
Invincible	273
Total	3,981
Wheat.	
Red Fife	1,765
Preston	1,602
Percy	811
Stanley	777
Laurel	668
White Fife	575
Huron	471
White Russian	280
Wellman's Fife	197
White Connell	167
Common Emmer	3
Total	7,316

Name of Variety.	Number of Packages.
Pease.	
Canadian Beauty	516
Prussian Blue	195
Arthur	52
Miscellaneous	83
Total	846
Indian Corn.	
Angel of Midnight	653
Selected Leaming	508
Early Mastodon	423
Compton's Early	222
Longfellow	207
Superior Fodder	90
Eureka	56
Total	2,159
Potatoes.	
Carman No 1	887
American Wonder	723
Rural Blush	606
Early White Prize	583
Everett	548
Rochester Rose	535
Reeve's Rose	449
Early Andes	448
Canadian Beauty	434
Early Sunrise	399
Early Ohio	394
Late Puritan	334
Uncle Sam	264
Wonder of the World	236
Beauty of Hebron	192
Thorburn	106
Miscellaneous	161
Total	7,299

DISTRIBUTION OF SAMPLES FROM THE BRANCH EXPERIMENTAL FARMS.

Samples were also distributed from the Branch Experimental Farms, as follows:—

Experimental Farm, Nappan, N.S.

	No. of Sample Bags.
Spring wheat	72
Oats	198
Barley	65
Pease	51
Buckwheat	25
Potatoes	331
Total	742

Experimental Farm, Brandon, Man.

	No. of Sample Bags
Spring wheat	134
Oats	166
Barley	60
Pease	49
Potatoes	128
Total	537

Experimental Farm, Indian Head, N.W.T.	No. of Sample Bags.
Spring wheat	420
Oats	542
Barley	367
Pease	176
Flax, Rye and Emmer	153
Potatoes	818
Total	2,476

Experimental Farm, Agassiz, B.C.	No. of Sample Bags.
Spring wheat	86
Oats	153
Barley	74
Pease	129
Potatoes	164
Total	597

By adding the number of samples distributed by the branch farms to those sent out by the central farm, we have a total of 37,174. It is gratifying to find among the farmers of Canada so large a number of volunteers ready to co-operate in this experimental work.

For ten years the volume of this work has been large, and the average number of experimenters to whom samples have been sent has been 36,406 each year.

In distributing this large quantity of seed grain great care is taken to have it clean and as far as possible true to name. Most of it is grown at the Experimental Farms at Indian Head and Brandon, where the crops average larger yields than they do at Ottawa. It is believed that better results can be got from samples of oats from a crop which has given 100 bushels per acre than from one giving 50 or 60 bushels. There is much individuality stamped on every variety, and it is doubtless an advantage to have seed grain from productive strains.

To provide the large quantity of seed required for this distribution, arrangements are made for growing it the previous year. While maturing in the fields most of the grain from which the samples for distribution are to be supplied is gone carefully over, and any plants found of other varieties pulled up. After the grain is threshed it is put through suitable cleaning machinery, and then thoroughly examined, and if any foreign admixture which the separators will not remove is found the grain is hand picked before it is sent out. There is no doubt that the high quality and productiveness of the cereals grown throughout the Dominion has been favourably influenced and very largely so by the placing of these comparatively small quantities of cereals of high quality in the hands of so many good men. From the samples received hundreds of farmers have within three seasons produced sufficient seed for their own sowing and a considerable surplus to sell to their neighbours.

CORRESPONDENCE.

The correspondence carried on during 1904 between the farmers of Canada and the officers of the Experimental Farms has been very large.

CENTRAL EXPERIMENTAL FARM.

The following is a summary of the letters received and sent out at the Central Experimental Farm from December 1, 1903, to November 30, 1904; also the number of reports, bulletins and circulars forwarded by mail during the same period:—

	Letters received.	Letters sent.
Director	43,791	18,530
Agriculturist	2,067	2,967
Horticulturist	1,479	1,417
Chemist	1,284	1,251
Entomologist and Botanist	3,231	2,909
Experimentalist	349	281
Poultry Manager	2,293	2,006
Accountant	867	873
	55,366	30,243

A large number of the letters received by the Director are applications for samples of grain or for the publications of the farms, a considerable proportion of which are answered by sending the correspondents the material asked for, accompanied by circular letters. This explains why the number of letters received so much exceeds the number sent out.

Circular letters, including circulars sent with samples of seed grain	33,825
Reports and bulletins mailed	345,853

BRANCH EXPERIMENTAL FARMS.

The correspondence with the superintendents of the branch experimental farms is also large, as shown by the following figures:—

	Letters received.	Letters sent.
Experimental Farm, Nappan, N.S.	2,030	1,790
" " Brandon, Man.	5,300	3,528
" " Indian Head, N.W.T.	5,849	5,871
" " Agassiz, B.C.	2,942	2,772

Much additional information has also been sent out from the branch farms in printed circulars. By adding the correspondence conducted at the branch farms to that of the central farm, it will be seen that 71,487 letters in all were received, and 44,204 sent out during the year.

TESTS OF THE VITALITY OF SEED GRAIN AND OTHER SEEDS.

The number of samples of seeds tested during the season of 1903-4 to find the proportion which would germinate, and to determine the percentage of plants of strong and weak growth, was 2,285.

This useful work has been carried on at the Central Experimental Farm every year since its establishment in 1887. The total number of samples tested since that time is 31,736. Farmers are invited to send in every year any samples which may be of doubtful vitality through injury before harvest or in harvesting or storing, so that their germinating power may be determined and their usefulness for seed purposes ascertained. The appliances available for these tests are all that could be desired, affording facilities for testing every sample in the soil, and also in germinators where the grain is placed between folds of linen or other fabric and kept constantly moist. In our experience there is no test so reliable as the soil, and it has often occurred when testing samples of low vitality in a germinator that the proportion of seeds which will start to grow between the moist folds of fabric in the apparatus will be larger than can be got from the same seed put into the soil. The information which is of practical use to the farmer is the proportion of seed which will grow in his fields when sown there. If the vitality of a sample is so weak that a large proportion of the young plants are unable to force their way through the soil, such seed, however high the percentage of germination shown in the germinator, is of less value for sowing.

During the past season 820 samples of oats have been tested, a large number of which were sent in from Northern Alberta, where the oat crop of 1903 was considerably injured by frost. In all cases where the germinating power was low, farmers were advised to dispose of such grain for feed and to buy oats of higher vitality for sowing. Many instances have come to our knowledge where such information supplied has saved farmers from much loss.

Any farmer may avail himself of the help which this branch of the work can give him; about an ounce of seed is all that is needed to allow of its germinating power

being determined. No charge is made for testing samples, and they may be sent to the Central Experimental Farm by mail free of postage and can usually be reported on in about a fortnight.

RESULTS of Tests of Seeds for Vitality, 1903-4:—

Kind of Seed.	Number of Tests.	Highest Percentage.	Lowest Percentage.	Percentage of Strong Growth.	Percentage of Weak Growth.	Average Vitality.
Wheat	679	100·0	17·0	81·6	4·6	86·2
Barley	269	100·0	22·0	83·2	6·9	90·1
Oats	820	100·0	1·0	60·3	10·0	*70·3
Rye	2	94·0	88·0	89·0	2·0	91·0
Pease	164	100·0	6·0			64·6
Grass	117	100·0	7·0			74·5
Clover	186	100·0	17·0			76·3
Corn	13	94·0	20·0			62·1
Radish	5	72·0	17·0			40·0
Sugar Beet	3	82·0	74·0			78·0
Cabbage	3	75·0	57·0			66·0
Tobacco	2	54·0	47·0			50·5
Ash Seed	2	14·0	10·0			12·0
Maple Seed	2	20·0	16·0			18·0
Rape	1	99·0	99·0			99·0
Miscellaneous vegetable seeds	17	100·0	10·0			49·8
Total number of samples tested, highest and lowest percentage	2,285	100·0	1·0			

TABLE showing Results of Grain Tests for each Province:—

ONTARIO.

Kind of Grain.	Number of Tests.	Highest Percentage.	Lowest Percentage.	Percentage of Strong Growth.	Percentage of Weak Growth.	Average Vitality.
Wheat	222	100·0	23·0	74·8	5·5	80·4
Barley	113	100·0	39·0	81·6	7·2	88·8
Oats	127	100·0	1·0	87·1	5·1	92·2

QUEBEC.

Wheat	45	100·0	53·0	88·4	3·3	91·7
Barley	17	100·0	58·0	87·5	7·5	95·0
Oats	21	100·0	47·0	83·5	5·9	89·5

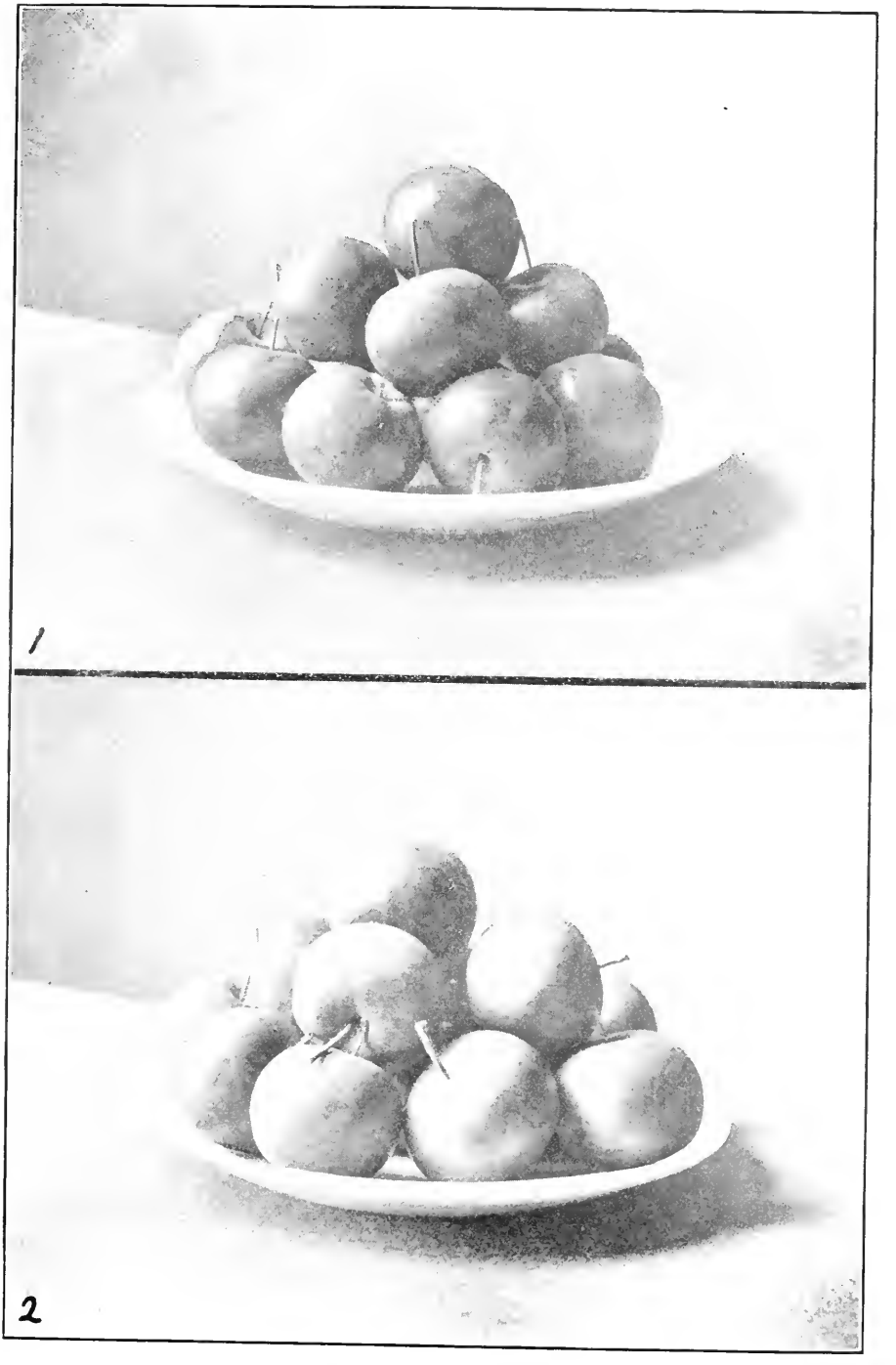
MANITOBA.

Wheat	155	100·0	38·0	86·3	4·0	90·3
Barley	33	100·0	22·0	86·1	4·5	90·6
Oats	159	100·0	6·0	74·7	8·3	83·1

NORTH-WEST TERRITORIES.

Wheat	170	100·0	23·0	80·2	5·2	85·4
Barley	76	100·0	26·0	83·2	5·7	88·9
Oats	481	100·0	3·0	45·6	12·3	*58·0

* This low average percentage in oats is due to the number of samples injured by unfavourable weather received from Northern Alberta. These samples ranged in vitality from 3 per cent and upwards. In other localities in the north-west the percentage of vitality ranged from 75 to 100 per cent.



1.—Alberta. 2.—Tony.

NOVA SCOTIA.

Wheat	30	100·0	60·0	87·4	2·4	89·9
Barley	10	100·0	86·0	83·1	11·9	95·0
Oats	9	98·0	67·0	81·1	5·7	86·7

NEW BRUNSWICK.

Wheat	31	100·0	17·0	89·0	2·9	91·9
Barley	10	99·0	86·0	84·5	12·1	96·6
Oats	10	99·0	89·0	87·9	6·8	94·7

PRINCE EDWARD ISLAND.

Wheat	20	100·0	86·0	92·6	2·7	95·3
Barley	8	100·0	83·0	86·3	7·6	94·0
Oats	10	100·0	91·0	92·1	4·3	96·4

BRITISH COLUMBIA.

Wheat	6	100·0	79·0	92·3	1·5	93·8
Barley	2	87·0	86·0	70·6	16·0	86·5
Oats	3	89·0	78·0	77·0	7·3	84·3

(Signed) WILLIAM T. ELLIS.

METEOROLOGICAL OBSERVATIONS.

TABLE of Meteorological Observations taken at the Central Experimental Farm, Ottawa, 1904; maximum, minimum and mean temperature for each month, with date of occurrence, also rainfall, snowfall and total precipitation.

Month.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total Precipitation.	Number of Days Precipitation.	Heaviest in 24 hours.	Date.
	°	°	°	°	°		°							
January	13·90	−4·91	18·82	4·50	30·5	31st	−30·2	5th	0·09	40·75	4·06	12	0·80	16th.
February	15·23	−5·66	20·89	4·78	38·0	22nd	−28·0	2nd	0·39	24·00	2·79	13	0·55	23rd.
March	32·49	14·66	17·83	23·57	42·8	23rd	−12·0	5th	2·09	13·75	3·46	16	0·83	26th.
April	47·15	30·01	17·14	38·58	66·0	24th	6·2	2nd	3·36	6·00	3·96	13	1·00	9th.
May	71·31	46·82	24·49	59·06	85·0	9th	35·2	12th	3·49	.....	3·49	10	0·88	15th.
June	75·98	53·82	22·16	64·90	87·5	25th	46·0	23rd	2·80	.....	2·80	14	0·49	15th.
July	78·86	56·34	22·51	67·59	95·0	19th	44·5	30th	3·31	.....	3·31	16	1·14	31st.
August	75·98	52·52	23·45	64·24	83·5	5th	42·8	30th	2·80	.....	2·80	13	1·68	20th.
September	64·95	45·34	19·60	55·14	80·0	11th	27·5	22nd	5·50	.....	5·50	15	1·58	24th.
October	53·31	34·76	18·55	44·03	70·1	10th	19·0	31st	1·80	....	1·80	10	0·72	21st.
November	36·27	22·10	14·17	29·18	52·0	3rd	0·0	29th	0·41	4·75	0·88	10	0·22	27th.
December	16·72	−1·03	17·76	7·85	35·7	31st	−20·6	25th	T	19·50	1·94	15	0·50	19th.

Rain or snow fell on 157 days during the 12 months.
Heaviest rainfall in 24 hours, 1·68 inches, on August 20th.
Heaviest snowfall in 24 hours, 8·00 inches, on January 16th.
The highest temperature during the 12 months, was 95·0° on July 19th.
The lowest temperature during the 12 months, was—30·2° on January 5th.
During the growing season rain fell on 13 days in April, 10 days in May, 14 days in June, 16 days in July, 13 days in August, and 15 days in September.
May, October and November, show the lowest number of days with precipitation, viz., 10 days in each month.
Total precipitation during the 12 months, 36·79 inches, as compared with 34·92 inches during 1903.

RAINFALL, Snowfall, and total Precipitation from 1890 to 1904, also the average annual amount that has fallen.

Year.	Rainfall.	Snowfall.	Total Precipitation
	In inches.	In inches.	In inches.
1890	24·73	64·85	31·22
1891	30·19	73·50	37·54
1892	23·78	105·00	34·28
1893	31·79	72·50	39·04
1894	23·05	71·50	30·20
1895	27·01	87·50	35·76
1896	21·53	99·75	31·50
1897	24·18	89·00	33·08
1898	24·75	112·25	35·97
1899	33·86	77·25	41·63
1900	29·48	108·00	40·27
1901	29·21	97·25	38·91
1902	25·94	101·75	36·10
1903	26·43	85·00	34·92
1904	25·95	108·75	36·79
Total for 15 years	401·88	1,353·85	537·21
Yearly average for 15 years	26·79	90·25	35·81

RECORD of Sunshine taken at the Central Experimental Farm, Ottawa, for the Year 1904.

Months.	Number of days with Sunshine.	Number of days without Sunshine.	Total hours Sunshine.	Average Sunshine per day.
January	14	17	65·1	2·10
February	19	10	97·0	3·34
March	24	7	129·4	4·17
April	21	9	129·4	4·31
May	28	3	233·8	7·54
June	27	3	236·4	7·88
July	29	2	224·0	7·22
August	28	3	252·2	8·13
September	25	5	145·3	4·84
October	24	7	107·2	3·45
November	22	8	99·0	3·30
December	19	12	70·6	2·27
Total			1,789·4	

(Sgd.) WILLIAM T. ELLIS,
Observer.

SPECIAL EXPERIMENTS WITH FERTILIZERS.

In the annual report of the experimental farms for 1893, details were given on pages 8 to 24 of the results of a series of tests which had then been carried on for some years with the object of gaining information regarding the effects which follow the application of certain fertilizers and combinations of fertilizers on the more important farm crops. The particulars there given covered the results of six years' experience with crops of wheat and Indian corn, and five years' experience with crops of oats, barley, turnips and mangels. The results of similar tests conducted for three years with carrots and one year with sugar beets were also given.

These experiments have been continued, and a summary of the results obtained has been given each year, taking the average yield of crops from the beginning, adding the results for the current year, and then giving the average yield for the full time. These tests were undertaken on virgin soil, on a piece of land which was cleared for the purpose. For particulars regarding the clearing and preparing of the land for crop in 1887-88 and its subsequent treatment, the reader is referred to the earlier issues of this report.

OBJECT IN VIEW IN CONDUCTING THESE EXPERIMENTS.

In establishing and conducting this series of experiments, the object in view has been to gain information as to the effects produced by certain fertilizers and combinations of fertilizers on particular crops. They were never intended to serve as model test plots such as farmers could copy with advantage in their general practice. On the contrary, to gain the information desired, it has been found necessary to use some fertilizers in unusual quantities, and in other instances to more or less exhaust the soil by a succession of crops of the same sort, practices which in ordinary farming would be extravagant or detrimental. From this long conducted series of tests much useful information has been gained, which appeals to the mind with greater force as experience accumulates from year to year.

VALUABLE INFORMATION GAINED.

These trials have shown that barn-yard manure can be most economically used in the fresh or unrotted condition; that fresh manure is equal, ton for ton, in crop-producing power to rotted manure, which, other experiments have shown, loses during the process of rotting about 60 per cent of its weight. In view of the vast importance of making the best possible use of barn-yard manure, it is difficult to estimate the value of this one item of information.

When these experiments were planned, the opinion was very generally held that untreated mineral phosphate, if very finely ground, was a valuable fertilizer, which gradually gave up its phosphoric acid for the promotion of plant growth. Ten years' experience has shown that mineral phosphate, untreated, is of no value as a fertilizer.

The use of sulphate of iron, which at the time these tests were begun, was highly recommended, as a means of producing increased crops, has also been proven to be of very little value for this purpose.

Common salt, which has long had a reputation with many farmers for its value as a fertilizer for barley, while others disbelieved in its efficacy, has been shown to be a most valuable agent for producing an increased crop of that grain, while it is of much less use when applied to crops of spring wheat or oats. Land plaster or gypsum has also proven to be of some value as a fertilizer for barley, while of very little service for wheat or oats. Some light has also been thrown on the relative usefulness of single and combined fertilizers.

CHANGES MADE IN THE EXPERIMENTS.

After ten years' experience had demonstrated that finely-ground, untreated mineral phosphate was of no value as a fertilizer, its use was discontinued in 1898. Prior to this it had been used in each set of plots in Nos. 4, 5, 6, 7 and 8, in all the different series of plots, excepting roots. In 1898 and 1899, similar weights of the Thomas' phosphate were used in place of the mineral phosphate, excepting in plot 6 in each series. In this plot the Thomas' phosphate was used in 1898 only.

After constant cropping for ten or eleven years, it was found that the soil on those plots to which no barn-yard manure had been applied was much depleted of humus, and hence its power of holding moisture had been lessened ,and the conditions for plant growth, apart from the question of plant food, had on this account become less favourable. In 1899 the experiments were modified and an effort made to restore some proportion of the humus and at the same time gain further information as to the value of clover as a collector of plant food. In the spring of that year ten pounds of red clover seed per acre was sown with the grain on all the plots of wheat, barley and oats. The young clover plants made rapid growth, and by the middle of October there was a thick mat of foliage varying in height and density on the different plots, which was ploughed under.

In 1900, 1901, 1902, 1903 and 1904, clover was again sown on all the grain plots, and was ploughed under in October. In 1900 and 1901 a good growth of clover was obtained, but in 1902 a severe frost in the spring destroyed a large proportion of the young plants, so that the crop available for ploughing under in the autumn was very light. In 1903 and 1904 the crop of clover ploughed under in the autumn was fairly good.

APPLICATION OF FERTILIZERS DISCONTINUED.

Another direction in which information was sought was in reference to the length of time which a liberal application of barn-yard manure would continue to affect subsequent crops, and in 1899 on plots 1, 2 and 6 the barn-yard manure, which had been used for ten or eleven years in succession, was discontinued. The phosphate fertilizer was also omitted on plot 6 in each series.

In 1900 all the fertilizers on all the plots were discontinued, and since then the same crops have been grown on all these plots from year to year without fertilizers, sowing clover with the grain each season. In this way some information has been gained as to the value of clover as a collector of plant food, and also as to the unexhausted values of the different fertilizers which have been used on these plots since the experiments were begun.

SPECIAL TREATMENT OF PLOTS OF INDIAN CORN AND ROOTS.

As it was not practicable to sow clover with the Indian corn and root crops, the sowing of these latter crops was discontinued in the spring of 1900 and clover sown in their place in the proportion of 12 pounds per acre. The clover on these plots made strong growth, so strong as to necessitate twice cutting during the season, the cut clover being left on the ground in each case to decay and add to the fertility of the soil. The clover was left over for further growth in the spring of 1901, and ploughed under for the roots about May 10, and for corn about the middle of that month. Then roots and Indian corn were again sown. In 1902 crops of Indian corn and roots were grown on these plots, but in 1903 the land was again devoted to clover.

WHEAT PLOTS.

The seed sown on each of these plots from the beginning has been in the proportion of 1½ bushels per acre, excepting in 1894; and the varieties used were as follows:—

In 1888 to 1891, White Russian, and in 1892-3, Campbell's White Chaff. In 1894, the Rio Grande wheat was used, when, owing to lack of germinating power in the seed, a larger quantity was required. From 1895 to 1904 inclusive, Red Fife wheat was used in the usual quantity of 1½ bushels per acre. In 1904 the Red Fife was sown May 6, and was ripe August 18.

TABLE I.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF WHEAT.

No. of Plot.	Fertilizers applied each year from 1888 to 1898 or 1899. No fertilizers used since. Clover sown in 1899 and each year since with the grain and ploughed under in the autumn.	Average Yield for Sixteen Years.		17th Season, 1904. Variety, Red Fife.		Average Yield for Seventeen Years.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
1	Barn-yard manure (mixed horse and cow manure) well rotted, 12 tons per acre in 1888; 15 tons per acre each year after to 1898 inclusive. No manure has been applied since then	22 28 13/16	4,022	26 20	2,750	22 37 13/17	3,947
2	Barn-yard manure (mixed horse and cow manure) fresh, 12 tons per acre in 1888; 15 tons per acre each year after to 1898 inclusive. No manure has been applied since then	22 38 11/16	4,053	26 10	2,880	22 50 8/17	3,985
3	Unmanured from the beginning	11 37 2/16	1,978	13 10	1,290	11 42 1/17	1,937
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 a similar weight of the Thomas' phosphate was used. No fertilizers have been applied since then	12 4 1/16	2,107	17 40	1,250	12 23 4/17	2,056
5	Mineral phosphate, untreated, finely ground, 500 lbs. nitrate of soda, 200 lbs. per acre used each year from 1888 to 1897 inclusive. In 1898 and 1899, 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then	12 58 7/16	2,773	19 ..	1,190	13 19 12/17	2,680
6	Barn-yard manure, partly rotted and actively fermenting, six tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897 inclusive. In 1898, 500 lbs. of Thomas' phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then	19 22 6/16	3,317	21 10	2,510	19 28 13/17	3,270
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899, 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then	13 38 8/16	2,607	17 40	2,310	13 52 7/17	2,590

TABLE I.—EXPERIMENTS WITH FERTILIZERS ON PLOTS OF WHEAT—*Concluded.*

No. of Plot.	Fertilizers applied each year from 1888 to 1898 or 1899. No fertilizers used since. Clover sown in 1899 and each year since with the grain and ploughed under in the autumn.	Average Yield for Sixteen Years.		17th Season, 1904. Variety, Red Fife.		Average Yield for Seventeen Years.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
8	Mineral phosphate, untreated, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899, 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then	11 34 2/15	2,218	16 40	2,390	11 50	2,225
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then	12 22 11/15	1,986	15 20	2,250	12 33 8/17	2,062
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then	13 27 4/15	2,953	13 40	2,640	13 28	2,935
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897 inclusive. No fertilizers have been applied since then	14 24 11/15	2,900	14 10	2,270	14 23 14/17	2,863
12	Unmanured from the beginning	10 31 14/15	1,943	13 10	1,490	10 41 9/17	1,911
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then	12 42 1/15	2,103	14 20	1,770	12 47 14/17	2,083
14	Bone, finely ground, 500 lbs.; wood ashes unleached, 1,500 lbs. per acre; used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then	15 26 14/15	2,681	17 ..	1,840	15 32 8/17	2,632
15	Nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then	14 15	2,496	16 ..	2,100	14 21 5/17	2,472
16	Muriate of potash, 150 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then	15 43 15/15	2,282	14 30	2,230	15 30 13/17	2,282
17	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then	13 1 11/15	2,432	13 40	3,170	13 3 14/17	2,475
18	Sulphate of iron, 60 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then	12 50 15/15	2,019	13 30	2,030	12 53 4/17	2,020
19	Common salt (Sodium chloride), 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then	13 47 7/15	1,667	15 40	1,470	13 54 1/17	1,655
20	Land plaster or gypsum (Calcium sulphate), 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then	12 53 15/15	1,989	12 50	1,600	12 53 13/17	1,966
21	Mineral superphosphate, No. 2, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been used since then	13 16 3/15	1,984	12 30	1,580	13 13 13/17	1,960

BARLEY PLOTS.

The quantity of seed sown per acre on the barley plots was 2 bushels in 1889 to 1891, 1½ bushels in 1892 and 1893, and 2 bushels from 1894 to 1904, inclusive. Two-rowed barley was used for seed throughout until 1902, when Mensury, a six-rowed sort, was tried. The varieties used were as follows: 1889 to 1891, Saale; 1892, Goldthorpe; 1893, Duck-bill; and in 1894 to 1901, Canadian Thorpe, a selected form of the Duck-bill. Since 1902 Mensury has been sown. In 1904 it was sown May 6, and was harvested on July 30.

TABLE II.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF BARLEY.

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used since. Clover sown in 1899 and each year since with the grain and ploughed under in the autumn.	Average Yield for Fifteen Years.		16th Season, 1904. Variety, Mensury.		Average Yield for Sixteen Years.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
1	Barn-yard manure, well rotted, 15 tons per acre each year to 1898, inclusive. No manure has been applied since then	35 25 7/15	3,060	42 4	2,860	35 45 3/15	3,047
2	Barn-yard manure, fresh, 15 tons per acre each year to 1898, inclusive. No manure has been applied since then	35 14 1/2	3,234	41 2	2,660	35 32 3/15	3,193
3	Unmanured from the beginning	14 28 13/15	1,537	16 42	1,430	14 35 11/15	1,539
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899 a similar weight of the Thomas' phosphate was used. No fertilizers have been applied since then	15 44 3/15	1,510	17 44	1,660	16 2 3/15	1,513
5	Mineral phosphate, untreated, finely ground, 500 lbs., nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then	21 10 3/15	2,219	22 14	1,800	21 13 3/15	2,193
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897, inclusive. In 1898 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then	28 26 3/15	2,396	37 4	2,720	29 3 1/2	2,419
7	Mineral phosphate, untreated, finely ground, 500 lbs. nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899, 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then	26 12 13/15	2,377	35 10	2,760	26 39 11/15	2,461

TABLE II.—EXPERIMENTS WITH FERTILIZERS ON PLOTS OF BARLEY—*Concluded.*

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used since. Clover sown in 1899 and each year since with the grain and ploughed under in the autumn.	Average Yield for Fifteen Years.		16th Season, 1904. Variety, Mensury.		Average Yield. for Sixteen Years.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
8	Mineral phosphate, untreated, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899, 560 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then..	21 37	1,835	35 30	2,070	22 30 9/16	1,850
9	Mineral superphosphate, No. 1, 500 lbs. per acre used each year from 1888 to 1899, inclusive. No fertilizers have been applied since then	21 26 5/15	1,729	28 46	1,280	22 0 9/16	1,701
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers have been applied since then.....	28 4	2,359	25 40	1,770	27 45 4/16	2,322
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers have been applied since then..	27 1 5/15	2,481	32 14	2,170	27 17 2/16	2,462
12	Unmanured from the beginning..... ..	14 12 6/15	1,228	17 24	1,420	14 22 1/16	1,249
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers have been applied since then..	15 15	1,421	21 22	1,560	15 33 7/16	1,430
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers have been applied since then..	24 1 5/15	2,089	27 34	2,630	24 12 8/16	2,123
15	Nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers have been applied since then..	22 7 10/15	2,270	19 8	1,530	21 46 11/16	2,224
16	Muriate of potash, 150 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers have been applied since then.	22 40 9/15	1,859	23 36	1,430	22 43 11/16	1,832
17	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers have been applied since then..	19 16 7/15	1,933	19 38	1,450	19 17 13/16	1,903
18	Sulphate of iron, 60 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers have been applied since then..	18 44 12/15	1,656	20 ..	1,250	18 47 14/16	1,633
19	Common salt (Sodium chloride) 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then.....	27 19	1,892	23 26	1,510	27 7 7/16	1,868
20	Land plaster or gypsum (Calcium sulphate), 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers have been applied since then.....	20 24	1,591	22 34	1,780	20 30 10/16	1,603
21	Mineral superphosphate, No. 2, 500 lbs. per acre, used each year from 1889 to 1899, inclusive. No fertilizers have been applied since then....	21 9 9/16	1,770	24 18	1,580	21 19 3/16	1,758

OAT PLOTS.

The quantity of seed sown per acre on the oat plots was 2 bushels in 1889 and 1890; 1½ bushels in 1891 to 1893, and 2 bushels from 1894 to 1904, inclusive. The varieties used were as follows: In 1889, Early English; in 1890 to 1893, Prize Cluster; and from 1894 to 1904, inclusive, the Banner. In 1904 Banner was sown April 22 and the plots were harvested August 17.

TABLE III.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF OATS.

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used since. Clover sown in 1899 and each year since with the grain and ploughed under in the autumn.	Average Yield for Fifteen Years.		16th Season, 1904. Variety, Banner.		Average Yield for Sixteen Years.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw	Yield of Grain.	Yield of Straw.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
1	Barn-yard manure, well rotted, 15 tons per acre each year to 1898, inclusive. No manure has been applied since then.....	51 11 12/15	3,226	57 12	3,040	51 24 7/15	3,214
2	Barn-yard manure, fresh, 15 tons per acre each year to 1898, inclusive. No manure has been applied since then.	55 17 5/15	3,368	58 18	3,110	55 23 12/15	3,352
3	Unmanured from the beginning.....	34 11 12/15	1,715	42 12	2,660	34 28 1/15	1,774
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre, used each year from 1888 to 1897 inclusive, In 1898 and 1899 a similar weight of the Thomas' phosphate was used. No. fertilizers have been applied since then	34 26 14/15	1,844	51 6	26 10	35 27 10/15	1,892
5	Mineral phosphate, untreated, finely ground, 500 lbs. nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899, 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then...	48 25 1/15	2,661	58 28	2,450	49 12 12/15	2,648
6	Barn-yarn manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897, inclusive. In 1898 500 lbs. of Thomas' phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then..	48 5 8/15	2,738	60 30	2,850	48 32 6/15	2,745
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899, 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then	49 4 3/15	3,143	53 18	2,890	49 13 14/15	3,121
8	Mineral phosphate, untreated, finely ground, 500 lbs.; wood ashes, unleached, 1,560 lbs. per acre used each year from 1888 to 1897, inclusive. In 1898 and 1899, 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then..	43 22 8/15	2,498	58 18	2,900	44 19 13/15	2,523
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers have been used since then..	38 5 11/15	1,976	50 10	2,340	38 31 7/15	1,999

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF OATS—*Continued.*

No. of Plot.	Fertilizers applied each year, from 1889 to 1898 or 1899. No fertilizers used since. Clover sown in 1899 and each year since with the grain and ploughed under in the autumn.	Average Yield for Fifteen Years.		16th Season, 1904. Variety, Banner.		Average Yield for Sixteen Years.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers have been applied since then	46 32	2,680	54 24	2,130	47 $14\frac{8}{15}$	2,645
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897, inclusive. No fertilizers have been applied since then	39 $..\frac{8}{15}$	2,427	37 32	2,650	38 $31\frac{14}{15}$	2,441
12	Unmanured from the beginning	23 $28\frac{5}{15}$	1,426	25 ..	1,540	23 $30\frac{5}{15}$	1,433
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then	34 $28\frac{5}{15}$	2,023	46 26	1,730	35 $19\frac{11}{15}$	2,095
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers have been applied since then	41 $18\frac{12}{15}$	2,237	50 20	2,350	41 $3\frac{14}{15}$	2,309
15	Nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers have been applied since then	47 6	2,746	43 28	2,480	46 $32\frac{14}{15}$	2,729
16	Muriate of potash, 150 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then	39 $5\frac{12}{15}$	2,218	54 24	2,210	40 $4\frac{11}{15}$	2,217
17	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers have been applied since then	45 $13\frac{5}{15}$	2,794	54 4	2,340	45 $32\frac{1}{15}$	2,766
18	Sulphate of iron, 60 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers have been applied since then	39 $-1\frac{1}{15}$	1,985	47 32	2,630	39 $13\frac{11}{15}$	2,025
19	Common salt (Sodium chloride), 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers have been applied since then	38 15	1,929	53 28	2,690	39 $13\frac{11}{15}$	1,979
20	Land plaster or gypsum (Calcium sulphate), 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers have been applied since then	34 32	1,966	46 26	2,610	35 $23\frac{2}{15}$	2,030
21	Mineral superphosphate, No. 2, 500 lbs per acre, used each year from 1889 to 1899, inclusive. No fertilizers have been applied since then.	35 17	1,859	51 26	2,580	36 $17\frac{2}{15}$	1,894

The one-tenth acre plots of wheat, barley and oats had by the end of 1903 become infested with several troublesome perennial weeds, hence it was thought best to sow only one-half of each plot with grain in 1904, devoting the other half to a hoed crop to clean it. On this account no clover was sown on any of the cereal plots in 1904, and one-half of the wheat plots was sown with mangels, one-half of the barley plots with potatoes, and one-half of the oat plots with carrots, computing the yields of grain from a one-twentieth acre plot in each case.

INDIAN CORN PLOTS.

The experiments with the plots of Indian corn have been conducted with the object of obtaining the largest weight of well matured green fodder for the silo, and to have the corn so far advanced when cut, that the ears shall be as far as is practicable in the late milk or glazed condition. Each plot has been divided from the outset into two equal parts, on one of which—known as No. 1—one of the stronger growing and somewhat later ripening sorts has been tried, and on the other, marked No. 2, one of the earlier maturing varieties. During the first four years one of the Dent varieties was tested under No. 1. The Mammoth Southern Sweet was tried in 1888 to 1890. In 1891 the Red Cob Ensilage was used, and in 1892 to 1902 the Rural Thoroughbred White Flint was tested. On the other half of the plot (No. 2) the Canada Yellow Flint was used in 1888 to 1890, the Thoroughbred White Flint in 1891, Pearce's Prolific in 1892 to 1894, and the Mammoth Eight-Rowed Flint in 1895 to 1902. For the first four years the No. 1 series was planted in drills 3 feet apart, using about 24 pounds of seed to the acre and thinning the plants, when up, to 6 or 8 inches, and the No. 2 in hills 3 feet apart each way with 4 or 5 kernels in a hill. During the past seven years both sorts have been grown in hills.

In 1900 no crop of Indian corn was grown on these plots, but clover was sown in its place on May 5 in the proportion of 12 pounds per acre. This made a strong growth, was cut twice during the season and left on the ground to decay, so that when ploughed under, the land might get the full benefit of the clover crop. The clover was allowed to remain growing until May 20, 1901. It was then ploughed under about 6 inches deep, and harrowed well before the corn was planted. Clover was sown again in 1903, and ploughed under in May, 1904. The corn was planted in 1904, on June 6, and cut for ensilage September 26.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF INDIAN CORN, CUT GREEN FOR ENSILAGE.

No. of Plot.	Fertilizers applied each year from 1888 to 1898 or 1899. No fertilizers used since. Clover sown in 1900 in place of the corn and ploughed under in May, 1901, before the corn was planted. In 1903 clover was again sown and ploughed under in May, 1904.	Average Yield for Fourteen Years.		15th Season, 1904.				Average Yield for Fifteen Years.	
		Plot No. 1—½ weight of green fodder.	Plot No. 2—½ weight of green fodder.	Plot No. 1—½ Selected Leaming, weight of green fodder.		Plot No. 2—½ Angel of Midnight, weight of green fodder.		Plot No. 1—½ weight of green fodder.	Plot No. 2—½ weight of green fodder.
		Per acre.	Per acre.	Per acre.		Per acre.		Per acre.	Per acre.
		Tons. lbs.	Tons lbs.	Tons	lbs.	Tons	lbs.	Tons lbs.	Tons lbs.
1	Barn-yard manure (mixed horse and cow manure) well rotted, 12 tons per acre, each year from 1883 to 1898 inclusive. No manure has been applied since then.	16 757	13 167	16	1,460	14	640	16 804	13 332
2	Barn-yard manure (mixed horse and cow manure) fresh, 12 tons per acre each year from 1888 to 1898 inclusive. No manure has been applied since then.	16 627	11 941	16	130	13	240	16 594	11 1,161
3	Unmanured from the beginning.	7 28	5 209	9	1,600	9	1,470	7 399	5 826
4	Mineral phosphate, untreated, finely ground, 800 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 a similar weight of the Thomas' phosphate was used. No fertilizers have been applied since then.	7 1,749	4 1,844	13	540	13	40	8 468	5 924

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF INDIAN CORN—*Continued.*

No. of Plot.	Fertilizers applied each year, from 1888 to 1898 or 1899. No fertilizers used since. Clover sown in 1900 in place of the corn and ploughed under in May, 1901, before the corn was planted. In 1903 clover was again sown and ploughed under in May, 1904.	Average Yield for Fourteen Years.				15th Season, 1904.				Average Yield for Fifteen Years.			
		½ Plot No. 1—weight of green fodder.		½ Plot No. 2—weight of green fodder.		½ Plot No. 1—Selected Leaming, weight of green fodder.		½ Plot No. 2—Angel of Midnight, weight of green fodder.		½ Plot No. 1—weight of green fodder.		½ Plot No. 2—weight of green fodder.	
		Per acre.		Per acre		Per acre.		Per acre		Per acre.		Per acre	
		Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Ton	lbs
5	Mineral phosphate, untreated, finely ground, 800 lbs., nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899, 800 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then	11	703	8	1,874	15	1,820	14	440	11	1,311	9	578
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897 inclusive. In 1898 500 lbs. of Thomas' phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then	16	493	11	1,861	16	190	15	260	16	473	12	288
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then	15	499	11	355	14	1,750	13	930	15	449	11	660
8	Mineral phosphate, untreated, finely ground, 500 lbs., wood ashes, unleached, 1,500 lbs., per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then	12	150	9	637	15	360	14	460	12	564	9	1,292
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then	11	483	8	1,315	13	600	11	350	11	757	8	1,651
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then	13	1,105	10	1,034	13	430	12	40	13	1,060	10	1,234
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then	16	526	12	613	16	620	15	520	16	532	12	1,007
12	Unmanured from the beginning	10	1,970	8	1,979	12	160	11	1,430	11	116	9	342
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then	12	371	9	784	13	880	12	1,110	12	538	9	1,206
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then	12	1,690	9	1,755	14	1,150	13	580	12	1,921	10	210
15	Nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then	12	1,317	9	1,406	11	50	10	530	12	1,099	9	1,481
16	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then	13	317	10	178	12	740	11	1,320	13	212	10	254

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF INDIAN CORN—*Concluded.*

No. of Plot.	Fertilizers applied each year from 1888 to 1898 or 1899. No fertilizers used since. Clover sown in 1900 in place of the corn and ploughed under in May, 1901, before the corn was planted. In 1903 clover was again sown and ploughed under in May, 1904.	Average Yield for Fourteen Years.		15th Season, 1904.				Average Yield for Fifteen Years.			
		Plot No. 1—weight of green fodder.	Plot No. 2—weight of green fodder.	Plot No. 1—Selected Leaming ear, weight of green fodder.		Plot No. 2—Angel of Midnight, weight of green fodder.		Plot No. 1—weight of green fodder.		Plot No. 2—weight of green fodder.	
		Per acre.		Per acre.		Per acre.		Per acre.		Per acre.	
		Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.
17	Mineral superphosphate, No. 1, 600 lbs.; muriate of potash 200 lbs.; sulphate of ammonia, 150 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then..	13	1,069	9	1,927	14	270	12	1,610	13	1,149	10	306
18	Muriate of potash, 300 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then..	9	1,836	7	211	13	120	12	1,440	10	255	7	960
19	Double sulphate of potash and magnesia, 300 lbs. per acre in 1889 and '90; (muriate of potash 200 lbs., substituted, each year since); dried blood, 300 lbs.; mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then..	12	509	8	1,689	13	1,510	13	810	12	765	9	297
20	Wood ashes, unleached, 1,900 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then.	10	1,739	8	356	14	1,510	13	1,800	11	257	8	1,119
21	Bone, finely ground, 500 lbs.; sulphate of ammonia, 200 lbs.; muriate of potash, 200 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then.....	12	1,347	7	1,207	12	1,950	12	70	12	1,387	7	1,797

PLOTS OF MANGELS AND TURNIPS.

In conducting these experiments, the roots only have been taken from the land, the tops have always been cut off and left on the ground to be ploughed under, so that the plant food they have taken from the soil may be returned to it. One-half of each one-tenth acre plot in the series has been devoted to the growth of mangels, and the other half to turnips, and these crops have been alternated from year to year. The preparation of the land has been the same for both these roots. Until 1900 it was ploughed in the autumn after the crop was gathered, gang-ploughed deeply in the spring after the barn-yard manure had been spread on plots 1, 2 and 6, and after gang-ploughing, the other fertilizers were spread by scattering them evenly over the surface, after which it was all harrowed with the smoothing harrow, then made in ridges 2 feet apart, rolled and sown.

In 1889, the variety of mangel used was the Mammoth Long Red. In 1890, three varieties were sown on each plot. In 1891, each plot again had three varieties, and from 1892 to 1902 one variety only was used, namely, the Mammoth Long Red. About 4 pounds of seed were sown per acre each year.

Two varieties of turnips were sown on the half plots devoted to these roots in 1889, and in 1890, a single variety, Carter's Elephant Swede. In 1891, six varieties were sown. In 1892, the Improved Purple Top Swede only was sown, in 1893 and 1894, the Prize Purple Top Swede, in 1895, the Imperial Swede, and from 1896 to 1902, the Prize Purple Top Swede. The land used for the turnips, which are usually sown later than the mangels, was prepared in the same manner as for the mangels. It was then allowed to stand until the day before sowing, when it was gang-ploughed shallow or cultivated to kill weeds and loosen the soil, ridged, rolled and sown. About 3 pounds of seed were sown per acre.

In 1900 and 1903, no crops of mangels and turnips were grown, but clover was sown in their place in May in the proportion of 12 pounds per acre. This made a strong growth and was cut twice each year during the season, and left on the ground to decay, so that when ploughed under, the land might get the full benefit of the clover crop. The clover was allowed to remain growing until near the middle of May, by which time it had made a very heavy growth. It was then ploughed under about 6 inches deep and harrowed well, then made up into ridges 2 feet apart. These were rolled with a hand roller, which flattened the ridges considerably and made a firm, even seed bed. The crops of clover and roots are alternated in this way, for the purpose of supplying humus and also of gaining information as to the fertilizing effect of green clover ploughed under on land to be used for growing roots.

In 1904, the mangels were sown on May 12, and pulled on October 14; the turnips were sown May 12, and pulled October 14. The yield per acre has been calculated in each case from the weight of roots gathered from two rows, each 66 feet long.

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EXPERIMENTS WITH FERTILIZERS ON PLOTS OF MANGELS AND TURNIPS.

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used since. Clover sown in 1900 in place of the roots and ploughed under in May, 1901, before the roots were sown. In 1903 clover was again sown and ploughed under in May, 1904.	Average Yield for Thirteen Years.		14th Season, 1904. Varieties.				Average Yield for Fourteen Years.			
				West Half Plot.		East Half Plot.					
		Mangels, Weight of Roots.	Turnips, Weight of Roots.	Mangels, Mammoth Long Red: Weight of Roots.		Turnips, Purple Top Swede: Weight of Roots.		Mangels, Weight of Roots.		Turnips, Weight of Roots.	
		Per Acre.		Per Acre.		Per Acre.		Per Acre.		Per Acre.	
		Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.
1	Barn-yard manure (mixed horse and cow manure) well rotted, 20 tons per acre each year from 1889 to 1898 inclusive. No manure has been applied since then.....	22	1,267	15	1,327	12	1,830	23	1,400	21	1,879	16	475
2	Barn-yard manure (mixed horse and cow manure) fresh, 20 tons per acre each year from 1889 to 1898 inclusive. No manure has been applied since then.....	21	732	15	1,522	12	1,200	23	200	20	1,535	16	570
3	Unmanured from the beginning.....	9	122	7	864	8	1,230	13	140	9	58	7	1,669
4	Mineral phosphate, untreated, finely ground, 1,000 lbs. per acre, used each year from 1889 to 1897, inclusive. In 1898 and 1899 a similar weight of the Thomas' phosphate was used. No fertilizers have been applied since then.....	8	1,577	7	1,903	9	1,340	17	1,490	8	1,739	8	1,307
5	Mineral phosphate, untreated, finely ground, 1,000 lbs., nitrate of soda, 250 lbs. wood ashes, unleached, 1,000 lbs. per acre, used each year from 1889 to 1897 inclusive. In 1898 and 1899, 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then.	14	1,493	9	1,943	11	1,250	13	70	14	963	10	1,099
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 1,000 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1889 to 1897 inclusive. In 1898 1,000 lbs. of Thomas' phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then..	18	53	12	1,949	12	1,760	18	1,230	17	1,318	13	735
7	Mineral phosphate, untreated, finely ground, 1,000 lbs.; sulphate of potash, 200 lbs. in 1889 and 1890 (substituted by muriate of potash, 250 lbs. in 1891 and subsequent years); nitrate of soda, 200 lbs. per acre, used each year from 1889 to 1897 inclusive. In 1898 and 1899 1,000 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then	11	1,252	9	1,030	10	1,960	14	340	11	1,162	9	1,695
8	Mineral superphosphate, No. 1, 500 lbs.; sulphate of potash, 200 lbs. in 1889 and 1890 (substituted by muriate of potash, 250 lbs. in 1891 and subsequent years); nitrate of soda, 200 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then	14	159	11	1,618	10	1,590	14	820	13	1,690	11	1,990

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF MANGELS AND TURNIPS—*Concluded*

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used since. Clover sown in 1900 in place of the roots and ploughed under in May, 1901, before the roots were sown. In 1903 clover was again sown and ploughed under in May, 1904.	Average Yield for Thirteen Years.		14th Season, 1904, Varieties.				Average Yield for Fourteen Years.			
				West Half Plot.		East Half Plot.					
		Mangels, Weight of Roots.	Turnips, Weight of Roots.	Mangels, Mammoth Long Red: Weight of Roots.	Turnips, Purple Top Swede: Weight of Roots.	Mangels, Weight of Roots.	Turnips, Weight of Roots.				
		Per Acre.		Per Acre.		Per Acre.		Per Acre.		Per Acre.	
		Tons. lbs.	Tons. lbs.	Tons. lbs.	Tons. lbs.	Tons. lbs.	Tons. lbs.	Tons. lbs.		Tons. lbs.	
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then..	9 1,306	9 339	10 1,240	18 1,410	9 1,444		9 1,701	
10	Nitrate of soda, 300 lbs. per acre, used each year from 1889 to 1899, inclusive. No fertilizers have been applied since then.....	14 823	9 918	10 1,420	14 990	14 294		9 1,637	
11	Sulphate of ammonia, 300 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then.	12 743	10 1,795	10 1,750	13 880	12 529		11 158	
12	Unmanured from the beginning....	7 894	7 645	7 1,910	12 1,320	7 966		7 1,407	
13	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,000 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then.....	12 842	8 1,891	9 50	14 220	12 356		9 628	
14	Wood ashes, unleached, 2,000 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then.....	11 70	8 317	12 740	16 1,200	11 266		8 1,523	
15	Common salt (Sodium chloride), 400 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then.	9 1,422	7 825	12 910	16 530	9 1,814		8 896	
16	Mineral superphosphate, No. 1, 500 lbs.; nitrate of soda, 200 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then..... ...	13 160	10 1,896	10 1,140	17 1,070	12 1,801		11 837	
17	Mineral superphosphate, No. 1, 350 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then..	13 1,179	10 694	10 970	21 1,200	13 735		11 301	
18	Mineral superphosphate, No. 1, 500 lbs.; muriate of potash, 200 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then.....	12 1,988	11 285	11 820	19 810	12 1,762		11 1,465	
19	Double sulphate of potash and magnesia, 300 lbs. per acre in 1889 and 1890 (muriate of potash, 200 lbs., substituted each year since); dried blood, 250 lbs.; mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then.....	14 820	12 503	11 1,750	18 990	14 458		12 1,395	
20	Wood ashes, unleached, 1,500 lbs.; common salt (Sodium chloride), 300 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then..	15 324	10 1,562	12 690	20 30	14 1,922		11 881	
21	Mineral superphosphate, No. 2, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then..	15 48	11 309	12 1,530	19 1,610	14 1,725		11 1,544	

The results had in 1904 in crops from the plots under these experiments show still further the benefits arising from the ploughing under of clover.

EFFECTS OF FERTILIZERS ON OATS, CLOVER AND BROME GRASS.

In continuation of the report made last year on the 'Effects of Fertilizers on Wheat, Oats, Clover and Brome Grass,' the following tables are submitted. A part of the wheat plots were unfortunately so injured as to make the comparisons in that series of no value, hence no reference is made to the wheat plots. Fertilizers were applied in the proportions stated to the different series of plots in 1900, 1902 and 1904.

RESULTS OF THE APPLICATION OF FERTILIZERS TO OATS.

Sown, May 9; Ripe, August 10, 1904.

No. of Plot.	Table I. Name of variety, Improved Ligowo.	Yield of Grain per Acre.		Yield of Straw per Acre.
		Bush.	Lbs.	Lbs.
1	Superphosphate, 400 lbs. per acre	70	20	3,160
2	Thomas' phosphate, 400 lbs. per acre	70	20	4,240
3	Thomas' phosphate, 800 lbs. per acre	82	12	2,920
4	Check	56	16	2,480
5	Thomas' phosphate, 400 lbs., kainit, 200 lbs. per acre	52	32	1,960
6	Superphosphate, 400 lbs., kainit, 200 lbs. per acre	51	26	3,200
7	Check	60	—	1,960
8	Thomas' phosphate, 400 lbs., kainit, 200 lbs., nitrate soda, 160 lbs. p. acre	81	26	4,180
9	Superphosphate, 400 lbs., kainit, 200 lbs., nitrate soda, 100 lbs. per acre	83	18	4,360
10	Barnyard manure, mixed horse and cow, fresh, 12 tons per acre	61	6	3,960
11	Barnyard manure, mixed horse and cow, well rotted, 12 tons per acre	80	—	4,320
12	Check	76	16	4,040
13	Fresh slacked lime, 1,000 lbs. per acre	71	26	4,600
14	Nitrate soda, 100 lbs. per acre	80	—	5,120
15	Check	62	12	3,920
16	Nitrate soda, 200 lbs. per acre	70	20	5,600

RESULTS OF THE APPLICATION OF FERTILIZERS TO CLOVER.

First cutting, June 23; second, August 29, 1904.

No. of Plot.	Table II. Fertilizers used.	Yield per Acre.							
		1st Cutting.				2nd Cutting.			
		Green.		Cured.		Green.		Cured.	
		Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
1	Superphosphate, 400 lbs. per acre	8	1,200	2	600	3	480	1	1,120
2	Thomas' phosphate, 400 lbs. per acre	9	920	3	80	3	—	1	1,200
3	Thomas' phosphate, 800 lbs. per acre	7	1,640	2	360	2	1,680	1	960
4	Check	7	80	2	260	3	360	1	1,220
5	Thomas' phosphate, 400 lbs., kainit, 200 lbs. per acre	8	1,040	2	960	3	1,680	1	1,600
6	Superphosphate, 400 lbs., kainit, 200 lbs. per acre	9	840	2	1,280	2	1,360	1	920
7	Check	8	1,440	2	800	2	1,280	1	880
8	Thomas' phosphate, 400 lbs., kainit, 200 lbs., nitrate soda, 100 lbs. per acre	8	1,320	2	720	2	1,200	1	400
9	Superphosphate, 400 lbs., kainit, 200 lbs., nitrate soda, 100 lbs. per acre	8	1,560	1	1,920	2	480	1	120
10	Barnyard manure, mixed horse and cow, fresh, 12 tons per acre	6	160	1	1,120	3	880	1	720
11	Barnyard manure, mixed horse and cow, well rotted, 12 tons per acre	7	120	1	1,960	2	1,280	1	400
12	Check	7	920	1	1,520	3	720	1	920
13	Fresh slacked lime, 1,000 lbs. per acre	6	400	1	1,360	2	400	1	—
14	Nitrate soda, 100 lbs. per acre	6	720	1	1,760	2	800	1	—
15	Check	5	1,240	1	1,080	3	400	1	1,520
16	Nitrate soda, 200 lbs. per acre	7	480	1	1,560	4	400	1	1,040

RESULTS OF THE APPLICATION OF FERTILIZERS TO AWNLESS BROME GRASS.

Crop Cut June 27, 1904.

No. of Plot.	Table III. Fertilizers used.	Height of Brome Grass	Yield per Acre.			
			Green.		Cured.	
		Inches.	Tons.	Lbs.	Tons.	Lbs.
1	Superphosphate, 400 lbs. per acre	44—48	9	320	4	1,040
2	Thomas' phosphate, 400 lbs. per acre	44—48	7	480	4	—
3	Thomas' phosphate, 800 lbs. per acre	44—48	7	1,400	3	—
4	Check	44—48	5	800	2	440
5	Thomas' phosphate, 400 lbs.; kainit, 200 lbs. per acre	45—50	5	1,600	2	800
6	Superphosphate, 400 lbs.; kainit, 200 lbs. per acre	45—50	7	—	2	1,800
7	Check	44—48	5	1,760	2	1,480
8	Thomas' phosphate, 400 lbs.; kainit, 200 lbs.; nitrate soda, 100 lbs. per acre	45—50	4	240	2	1,800
9	Superphosphate, 400 lbs.; kainit, 200 lbs.; nitrate soda, 100 lbs. per acre	45—50	9	80	3	1,920
10	Barn-yard manure, mixed horse and cow, fresh, 12 tons per acre	45—50	7	560	3	560
11	Barn-yard manure, mixed horse and cow, well rotted, 12 tons per acre	45—50	6	—	2	840
12	Check	44—48	5	880	2	560
13	Fresh slacked lime, 1,000 lbs. per acre	44—48	3	1,800	1	1,760
14	Nitrate soda, 100 lbs. per acre	45—50	7	40	3	240
15	Check	45—50	8	160	3	1,040
16	Nitrate soda, 200 lbs. per acre	45—50	7	640	3	320

INCREASED CROPS FROM THE PLOUGHING UNDER OF CLOVER.

Further experiments have been conducted during 1904 to show the benefit arising from the ploughing under of clover to add humus and fertility to the soil. In all these experiments there has been a marked increase in the crop the first year following the ploughing under of clover, a considerable increase the second year, and some increase on the third year after clover.

Plot.	Group I.	1904.						
		Banner Oats.				Corn Selected Leaming.		Potatoes. Everett.
		Yield of Grain.		Yield of Straw.		Yield per acre.		Yield per acre.
		Per acre.		Per acre.				
		Bush.	Lbs.	Lbs.		Tons.	Lbs.	Bush.	Lbs.
1	Crop in 1904 after clover in 1903	63	8	4,080		29	1,600	402	—
2	Crop in 1904 on plot where no clover was grown in 1903	43	18	2,080		26	400	362	20
	Gain from use of clover	24	24	2,000		3	1,200	39	40

GROUP 2.

In each of the divisions of this group there were also three plots. In the upper three in each table, the crops were sown after clover, grown in 1901, and ploughed under in the autumn of that year; the lower three show the crops where no clover was grown. In divisions 3, 6 and 9 the effect is also shown, on the crops of 1903 and 1904, of allowing the clover sown in 1901 to grow for two seasons and ploughing it under in the autumn of 1902.

DIVISION 1.	1902. BANNER OATS.		1903. TURNIPS.		1904. POTATOES.	
	Yield of Oats. — Per acre.		Weight of Straw. — Per acre.	Yield per acre.		Yield per acre.
	Bush.	Lbs.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1 Crops in 1902-3-4, after clover in 1901	72	20	4,720	25	—	390	—
2 Crops in 1902-3-4, on plot where no clover was grown in 1901	58	28	3,120	20	1,920	376	20
Gain from use of clover	13	26	1,600	4	80	13	40

DIVISION 2.	1902. POTATOES, EVERETT.		1903. CARROTS.		1904. POTATOES, EVERETT.	
	Yield Per Acre.		Yield Per Acre.		Yield Per Acre.	
	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
3 Crops in 1902-3-4, after clover in 1901	392	40	20	1,400	378	40
4 Crops in 1902-3-4, on plot where no clover was grown in 1901	358	—	18	280	346	20
Gain from use of clover	34	40	2	1,120	32	20

DIVISION 3.	1902. CORN SELECTED LEAMING.		1903. POTATOES, EVERETT.		1904. MENSURY BARLEY.		
	Yield Per Acre.		Yield Per Acre.		Yield of Barley. — Per Acre.		Weight of Straw. — Per Acre.
	Tons.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Lbs.
5 Crops in 1902-3-4, after clover in 1901	20	800	202	—	45	—	3,840
6 Crops in 1902-3-4, on plot where no clover was grown in 1901	15	—	154	40	38	16	3,750
Gain from the use of clover	5	800	47	20	6	32	90
7 Crops in 1903-4, on plot where clover was allowed to grow two seasons			200	40	35	—	3,720
8 Crops in 1903-4, on plot where no clover was grown in 1901			134	40	32	24	2,210
Gain from the use of clover			66	00	2	24	1,510

GROUP 2—*Continued.*

DIVISION 4.	1902. BANNER OATS. Yield of Oats. — Per Acre.	1902. BANNER OATS. Weight of Straw. — Per Acre.	1903. MANGELS. Yield Per Acre.	1904. TURNIPS. Yield Per Acre.
	Bush. Lbs.	Lbs.	Tons. Lbs.	Tons. Lbs.
9 Crops in 1902-3-4, after clover in 1901	70 20	4,960	30 1,000	24 40
10 Crops in 1902-3-4, on plot where no clover was grown in 1901	61 6	2,720	27 320	19 1,160
Gain from the use of clover	9 14	2,240	3 680	4 880

DIVISION 5.	1902. POTATOES, EVERETT. Yield Per Acre.	1903. SUGAR BEETS. Yield Per Acre.	1904. TURNIPS. Yield Per Acre.
	Bush. Lbs.	Tons. Lbs.	Tons. Lbs
11 Crops in 1902-3-4, after clover in 1901	386 20	20 680	27 360
12 Crops in 1902-3-4, on plot where no clover was grown in 1901	346 40	16 1,040	25 640
Gain from use of clover	39 40	3 1,640	1 1,720

DIVISION 6.	1902. CORN SELECTED LEAMING. Yield Per Acre.	1903. CORN SELECTED LEAMING. Yield Per Acre.	1904. BANNER OATS. Yield of Oats. — Per Acre.	1904. BANNER OATS. Weight of Straw. — Per Acre.
	Tons. Lbs.	Tons. Lbs.	Bush. Lbs.	Lbs.
13 Crops in 1902-3-4, after clover in 1901	23 1,200	18 1,440	61 6	3,600
14 Crops in 1902-3-4, on plot where no clover was grown in 1901	17 720	14 1,200	54 4	2,880
Gain from use of clover	6 480	4 220	7 2	720
15 Crops in 1903-4, on plot where clover was allowed to grow two seasons	.....	15 1,600	56 16	2,680
16 Crops in 1903-4, on plot where no clover was sown in 1901	.....	7	45 30	2,440
Gain from use of clover	.....	8 1,600	10 20	240

DIVISION 7.	1902. BANNER OATS. Yield of Oats. — Per Acre.	1902. BANNER OATS. Weight of Straw. — Per Acre.	1903. PRESTON WHEAT. Yield of Wheat. — Per Acre.	1903. PRESTON WHEAT. Weight of Straw. — Per Acre.	1904. MANGELS. Yield Per Acre.
	Bush. Lbs.	Lbs.	Bush. Lbs.	Lbs.	Tons. Lbs.
17 Crops in 1902-3-4, after clover in 1901	72 32	5,280	16 ..	1,760	21 1,080
18 Crops in 1902-3-4, on plots where no clover was grown in 1901	63 18	3,280	14 40	1,400	21 80
Gain from the use of clover	9 14	2,000	1 20	360	.. 1,000

GROUP 2.—*Concluded.*

DIVISION 8.	1902. POTATOES, EVERETT. Yield Per Acre.		1903. MENSURY BARLEY. Yield of Barley. — Per Acre.		1903. MENSURY BARLEY. Weight of Straw. — Per Acre.	1904. MANGELS. Yield Per Acre.	
	Bush.	Lbs.	Bush.	Lbs.	Lbs.	Tons.	Lbs.
19 Crops in 1902-3-4, after clover in 1901	396	..	51	32	2,640	26	1,520
20 Crops in 1902-3-4, on plot where no clover was grown in 1901	353	20	50	.....	2,520	26	440
Gain from the use of clover	42	40	1	32	120	..	1,080

DIVISION 9.	1902. CORN, SELECTED LEAMING. Yield Per Acre.		1903. BANNER OATS. Yield of Oats. — Per Acre.		1903. BANNER OATS. Weight of Straw. — Per Acre.	1904. CORN, SELECTED LEAMING. Yield Per Acre.	
	Tons.	Lbs	Bush.	Lbs.	Lbs.	Tons.	Lbs.
21 Crops in 1902-3-4, after clover in 1901	22	1,600	82	12	3,920	24	1,200
22 Crops in 1902-3-4, on plot where no clover was grown in 1901	16	800	76	16	3,240	22	..
Gain from the use of clover	6	800	5	30	680	2	1,200
23 Crops in 1903-4, on plot where clover was allowed to grow two seasons	.....		87	2	4,880	25	860
24 Crops in 1903-4, on plot where no clover was grown in 1901	.....		74	4	4,080	24	1,200
Gain from the use of clover	.....		12	32	800	..	1,600

INFLUENCE of Previous Crops on Yield of Grain and Weight of Straw of Banner Oats, grown in 1904.

BANNER OATS.	1904. BANNER OATS. Yield of Oats. — Per Acre.		1904. BANNER OATS. Weight of Straw. — Per Acre.
	Bush.	Lbs.	Lbs.
1 Crop in 1904, after horse beans, rows 21 inches apart in 1903	61	6	3,280
2 Crop in 1904, after horse beans, rows 28 inches apart in 1903	80	..	4,720
3 Crop in 1904, after pease, crop harvested in 1903	83	18	5,160
4 Crop in 1904, on plot where crop of oats was harvested in 1903	84	24	5,280
5 Crop in 1904, after pease, crop ploughed under twice in 1903	88	8	6,280
6 Crop in 1904, after soja beans, rows 21 inches apart in 1903	52	32	2,400
7 Crop in 1904, after soja beans, rows 28 inches apart in 1903	72	32	3,600
8 Crop in 1904, after crop of sand vetch harvested in 1903	78	28	5,080
9 Crop in 1904, on plot where crop of oats was harvested in 1903	83	18	5,260
10 Crop in 1904, after sand vetch ploughed under twice in 1903	89	14	5,480
11 Crop in 1904, after alsike clover in 1903	45	10	2,140
12 Crop in 1904, on plot where no clover was grown in 1903	28	8	1,120
13 Crop in 1904, after buckwheat crop harvested in 1903	30	20	1,640
14 Crop in 1904, on plot where crop of oats was harvested in 1903	71	26	3,640
15 Crop in 1904, after buckwheat, ploughed under twice in 1903	67	2	4,120
16 Crop in 1904, after Alfafa clover in 1903	44	24	2,440
17 Crop in 1904 on plot where no clover was grown in 1903	35	10	1,680
18 Crop in 1904, after flax in 1903	27	2	1,440
19 Crop in 1904, on plot where no flax was grown in 1903	49	14	2,160
20 Crop in 1904, after hairy vetch in 1903	70	20	3,840

BULLETINS ISSUED DURING 1904.

Four bulletins have been issued during the year.

No. 44, on the 'Results obtained in 1903 from trial plots of grain, fodder, corn, field roots and potatoes,' issued jointly by the Director and the Experimentalist. In this bulletin there are presented the results of a large number of experiments which were conducted at all the experimental farms during the season of 1903, with oats, barley, spring wheat, pease, Indian corn, turnips, mangels, carrots, sugar beets and potatoes, in plots of uniform size and the crops grown under uniform conditions. Both earliness and productiveness are recorded. The average results are also given of the tests for a series of years of those varieties which have proved most profitable.

No. 45, on Emmer and Spelt, prepared by Dr. C. E. Saunders, Experimentalist, in which are given a number of descriptions of varieties of these two sorts of grain; the results are also submitted of many experiments which have been conducted with these cereals at the experimental farms.

Much interest has been awakened of late among farmers in some parts of this country in the growing of emmer and spelt, and in the bulletin referred to many facts are brought together, regarding the proportion of hull to kernel and the relative usefulness and cropping power of emmer and spelt in comparison with other cereals. There are also given in this bulletin the results of some analyses made by the Chemical Division of the kernels and hulls of emmer and spelt, showing the relative nutritive value of these cereals.

No. 46, on 'Alfalfa or Lucern, its culture, use and value.' This bulletin consists of three parts: Part 1 was prepared by Mr. J. H. Grisdale, Agriculturist of the Central Experimental Farm; Part 2, by Mr. Frank T. Shutt, Chemist of the Experimental Farms, and Part 3 by Dr. James Fletcher, Entomologist and Botanist of the Experimental Farms.

In reference to this plant, the economy of growing it for the feeding of stock and for ploughing under to enrich the soil, its deep rooting habit which gives it the power of drawing moisture and plant food from depths not reached by other plants, and the large quantities of palatable and nutritious fodder which it produces, are all discussed in this bulletin, also its adaptability to many of the climatic conditions found in the Dominion.

No. 47, 'Trees and Shrubs tested in Manitoba and the North-west Territories,' prepared by the Director. In this bulletin are given the results of a very large number of trials of trees and shrubs which have been planted at the Experimental Farms at Brandon, Manitoba, and at Indian Head, in the North-west Territories, during the past sixteen years to ascertain what species and varieties are hardy enough to endure the winter in those parts of the Dominion. In this bulletin is presented in a convenient and condensed form all the facts ascertained for the instruction and encouragement of those who desire to adorn their homes with these objects of beauty. The love of trees and shrubs is almost universal and nowhere is it more strongly felt than on the North-west plains where trees and shrubs are scarce. Hitherto considerable sums of money have been spent annually by settlers in the purchase of trees and shrubs from the east, most of which have been too tender to endure the climate. The information given in this bulletin will, it is hoped, greatly lessen this injudicious expenditure. This bulletin will also be useful to residents of eastern Canada, since any of the species found hardy enough to endure the climate of the North-west, may be planted with assurance of success in any of the eastern parts of this country.

SESSIONAL PAPER No. 16

VISITS TO THE BRANCH EXPERIMENTAL FARMS.

THE EXPERIMENTAL FARM AT BRANDON, MAN.

On August 5, I left Ottawa for the annual tour of inspection of the branch experimental farms and arrived in Brandon on August 7. Several days were spent on this farm at that time and two days more on the return journey, September 15-16. The crops on the higher lands on the farm were in good condition, but a heavy flooding of the Assiniboine river had seriously injured those on the lower lands. Rust prevailed on some of the plots of cereals to a limited degree, nevertheless many of the crops were very heavy.

In the uniform trial plots, the best varieties of spring wheat gave from 30 to 36 bushels per acre, six-rowed barley, 54 to 66 bushels, and two-rowed from 55 to 63 bushels per acre. Oats gave extraordinary returns, ranging from 112 to 134 bushels per acre, pease also gave extra heavy crops, from 60 to 85 bushels per acre. Roots also did well, and potatoes gave an immense crop, from 500 to 650 bushels per acre.

The fields gave evidence of good and careful cultivation. The stock, implements and buildings were also found in good condition.

The orchards of cross-bred apples and seedling crabs have made strong growth and some new and promising varieties were fruiting for the first time.

The pasture fields looked well, and the crop of hay was very fair. The forest and ornamental trees, also the shrubs and flowers had made good growth and presented an attractive appearance.

THE EXPERIMENTAL FARM AT INDIAN HEAD, N.W.T.

This farm was visited on August 10-12 and September 13-14. The wheat was an excellent crop. The best sorts on the trial plots gave from 45 to 50 bushels per acre, while the larger fields averaged about 40 bushels, the grain weighing from 61 to 63 lbs. per bushel. The wheat crop throughout this district was good and in many instances from 35 to 40 bushels per acre was harvested. The experiments carried on at Indian Head with early ripening varieties of grain command much attention from farmers. The Preston, Stanley and Huron, cross-bred sorts produced at the Central Experimental Farm were ripe and cut this year about a week before the Red Fife was ready to harvest.

The crop of oats was very heavy, ranging from 90 to 120 bushels per acre, while the best yielding sorts of barley gave from 60 to 67 bushels. There was very little rust on any of the cereals in the North-west. Pease yielded unusually well, from 60 to 68 bushels per acre, and the most prolific sorts of potatoes from 350 to 435 bushels.

Bromus inermis.—Brome grass is now a well established and important crop, and with the western rye grass *Agropyrum tenerum* furnishes the greater part of the hay fed to horses and cattle on the Experimental Farm. Indian corn has been successfully grown, giving from 10 to 20 tons of green fodder per acre. Field roots have also done well, excepting carrots, the crop of which has been light.

Many of the Siberian crabs and cross-bred apples fruited well; trees and shrubs also, planted for shelter and ornament, made luxuriant growth, while annual and perennial flowers provided a wealth of bloom.

Stock of all sorts looked well, giving evidence of attention and care. The buildings were in good condition and the implements well cared for.

THE EXPERIMENTAL FARM AT AGASSIZ, B.C.

The farm at Agassiz was visited from August 25 to 30. Both fruit and forest trees were found to be suffering from the drought which had prevailed for some weeks

previous. The leaves were turning yellow. Extensive fires were consuming the forests in many districts and much valuable timber was destroyed. The air in many localities was so filled with smoke as to veil the beauties of the landscape.

The hay crop had been an excellent one and the clover exceptionally heavy. The yield of grain also was fairly good. Oats have given as high as 67 bushels per acre, barley 63 bushels, and spring wheat 33 bushels per acre. Indian corn had made good growth but was rather uneven, due chiefly to faulty germination of the seed. Roots and potatoes promised well.

The fruit orchards were not in a very satisfactory condition. Many of the young apple trees have been greatly injured by canker which has spread rapidly and proved very destructive, making it necessary to root up many of the trees. Pears were a very light crop and some of the trees were withering from the drought. Plums were a fair crop and the rot was not very prevalent this season, so that most of the fruit was gathered in good condition.

Blackberries were fruiting well and raspberries had given a fair crop. Currants and gooseberries had also borne fairly well. The nut trees and mulberries were well laden with fruit.

The cattle and sheep were in good condition, and notwithstanding the long period of dry weather the pastures were looking fairly well. Pigs were thriving, but the litters had been smaller than usual. The fowls had made good progress and there was a large number of chickens.

VISIT TO VICTORIA.

While in Victoria, several orchards were seen and the crops seemed to be fully up to the average. One of these, owned by Mr. R. M. Pamler, deserves special notice. In has been established as a commercial orchard and comprises twenty acres in all. The trees have all been planted about eighteen feet apart with the intention of allowing them to bear until they begin to crowd each other and then gradually thin them out. In this orchard there are planted about 3,000 trees. The apples number about 2,000 and consist chiefly of Wealthy, Blenheim Orange, Duchess, Boskoop, Cox's Orange Pippin and Lord Suffield. Of pears there are about 200, chiefly Bartlett, Louise Bonne and Beurre Bosc. The cherries, of which there are about 800, are largely Olivet, Belle Magnifique and English Morello.

This method of growing fruit on the Island is said to have been very satisfactory and to have given good returns.

VISIT TO VERNON AND PENTICTON.

While at Vernon a visit was paid to the Coldstream ranch where the large orchards planted by Lord Aberdeen are now bearing abundantly. These orchards are in splendid condition and remarkably clean and well cultivated. The trees are thrifty with well formed heads, and the fruit is regularly thinned, so that none of the trees are allowed to overbear. Nearly all the fruit produced is of first quality.

The journey on Lake Okanagan from Okanagan Landing to Penticton was very enjoyable, and at the various landing places there was evidence of much progress, and settlement is going on rapidly. Kelowna, which is about half way down the lake, has now become a town of good size, and in the surrounding country, orchards can be seen in every direction. On the return journey, the steamer took on shipments of fruit, &c., for the east. At Summerland, 700 boxes of tomatoes, apples and plums were received, and at Peachland and Kelowna additional shipments were made. There is a rapidly growing business in fruits and vegetables throughout this region.

THE EXPERIMENTAL FARM AT NAPPAN, N.S.

The annual visit was paid to this farm in October, when all the crops were found to be harvested, excepting field roots. Owing to the unusually dry weather in

the summer all the grain and fodder crops were light. Hay was 20 to 25 per cent below the average, while oats, wheat and barley had also given considerably less than an average yield ; the quality of the grain, however, was good. Indian corn was not a heavy crop and had been cut by a severe frost which had lessened its weight. The crop of turnips was heavy, giving from 30 to 40 tons per acre.

The stock was in good condition, the steers under feeding tests were making satisfactory progress and the dairy cows milking fairly well.

The apple orchards have made good progress, and a large proportion of the trees have borne good crops. Pear trees have given very little fruit during 1904, some of the varieties look very healthy, while others have made but a short and feeble growth. Similar variation was noticeable among the plums and some of the European sorts had fruited fairly well, but the American plums seem to be of little value here.

Of cherries the Bigarreau varieties in the older and more exposed orchard have suffered much from winter killing of the wood, whereas in the younger orchard in the shelter of the woods they have mostly escaped injury. Many of the Morello's and Russian sorts have made good growth, but have had very little fruit this year, probably because of the killing of the blossom buds during the severe winter of 1903-04. Some seedlings of the Kentish cherry, which is found in many parts of Nova Scotia, have been planted and are making promising growth. A large proportion of the cherries raised by the farmers of Nova Scotia are from seedling trees of this character, which are very generally distributed, are very hardy and usually bear good crops.

ACKNOWLEDGMENTS.

Grateful acknowledgments are due to those who have rendered me special service during the year. To the Director of the Arnold Arboretum, Jamaica Plains, Mass., for seeds of many different sorts of trees and shrubs, also for a fine collection of specimens of Crataegus and other rare trees for the Arboretum at Ottawa. To the United States Department of Agriculture, for many favours, including samples of cereals, seeds of fodder crops, &c., for test from foreign countries. To the Director of the Royal Gardens, Kew, England, for seeds of many sorts of trees, shrubs and plants. To Prof. John Macoun and Mr. J. M. Macoun, both of the Geological and Natural History Survey of Canada, for seeds of rare Canadian plants.

To the officers of the Central and Branch Experimental Farms my thanks are due for their earnest co-operation in carrying on the different divisions of the work. Grateful acknowledgments are also due to those members of the staff who have aided me in those branches of which I have had personal charge. To Mr. John Fixter, the farm foreman, who has taken charge of the special tests made with fertilizers on farm crops and aided me with practical suggestions. To Mr. George Fixter, to whom I am indebted for his careful supervision of the distribution of samples of seed grain. To Miss M. Hager, for valuable help in the taking of field notes and in the compilation of records in connection with work on the several experimental farms. To Mr. James Taggart, for the care and good judgment he has displayed as foreman of the ornamental grounds, and to Mr. Wm. T. Ellis, who has done careful work in testing the vitality of seeds, the management of the plants in the green-house and in propagating useful plants for outside decoration. Mr. Ellis has also rendered useful service in the taking of meteorological records.

I also take pleasure in bearing testimony to the faithful services of my secretary, Mr. Malcolm C. O'Hanly. The employees also of all the farms have my thanks for the interest they have taken in their work, and the care with which they have discharged their respective duties.

WM. SAUNDERS.
Director of Experimental Farms.

REPORT OF THE AGRICULTURIST

(J. H. GRISDALE, B. AGR.)

DR. WM. SAUNDERS,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith reports upon the horses, cattle, sheep, swine and farming operations under my supervision during the past year.

I have to report a fairly successful year in the different branches of my division and in this connection I wish to acknowledge my indebtedness for assistance and interested co-operation in their various positions of the farm foreman, Mr. John Fixter, of the herdsman, Mr. C. T. Brettell, and of the dairyman, Mr. J. Meilleur.

During the year I have attended a number of meetings in various parts of Canada, and have conducted a number of student judging contests, in addition to my regular work of supervising and directing the experimental feeding and farming operations at the Central Experimental Farm.

From December 1, 1903, to November 30, 1904, 2,067 letters were received and 2,967 despatched by the agricultural division.

I have the honour to be, sir,
Your obedient servant,
J. H. GRISDALE,
Agriculturist.

LIVE STOCK.

The live stock now (December 1, 1904) occupying the different stables and pens under my charge include horses, cattle, sheep and swine.

HORSES.

The horses are kept for labour exclusively, although some experimental feeding is usually under way to gain some information as to the most economical methods of feeding draught horses, as well as experiments to determine the comparative values of different foods as forage for the same.

The horses are usually 19 in number, made up of:—

Thirteen heavy draught horses of Clydesdales and Percheron blood.
Five heavy driving horses.
One light driver.

CATTLE.

There are representatives of four breeds of cattle, viz.:—Shorthorn, Ayrshire, Guernsey and Canadian. There are besides, a number of grade cattle and steers. These cattle are kept for breeding and feeding operations, mostly of an experimental character. Pure bred breeding animals are usually on sale, however, and a considerable number are sold in the course of the year.

Pure Bred Breeding Cattle.

The pure bred cattle in the barns at present are as follows:—
Shorthorns, including 3 bulls and 13 females.
Ayrshires, including 2 bulls and 15 females.
Guernseys, including 4 bulls and 8 females.
Canadians, including 1 bull and 7 females.

Grade Cattle.

At present the grades number 17 head, made up of 3 Shorthorn grades, 5 Ayrshire grades, 7 Guernsey grades and 2 Canadian grades.

Steers.

Sixty-three steers are under feed at present. They are of different ages and breeding and the number is made up of:—

15 three-year-olds.
20 two-year-olds.
16 yearlings.
12 calves.

SHEEP.

Sheep are not kept in large numbers, only 43 being now in the pens. Two breeds are kept, namely : Shropshires and Leicesters.

There are 25 Shropshires, as follows :—1 aged ram, 3 spring ram lambs, 14 aged ewes and 7 ewe lambs.

The Leicesters number 13, made up as follows :—1 aged ram, 2 ram lambs, 7 aged ewes and 4 ewe lambs.

There are besides two grades and three wethers.

SWINE

One hundred swine of all classes are now in the pens being fed experimentally or being kept for breeding purposes. The breeds kept are Berkshires, Tamworths and Yorkshires.

The Yorkshires are 37 in number, including:
2 stock boars.
4 young boars.
10 breeding sows.
6 young sows.
15 sucklings.

The Berkshires are 7 in number, including :
1 stock boar.
4 breeding sows.
2 young sows.

The Tamworths are 5 in number, including:
3 breeding sows.
1 young sow.
1 young boar.

HORSES.

There are 19 horses in the stables. These horses are expected to do the work in the various departments during the year. The work on the '200 acre farm' is but a part of their duties. They work in addition for the horticultural and experimental departments, as well as upon the lawns and in the arboretum. In addition a large amount of hauling in connection with the different departments, as well as road making and messenger service, takes up much of their time.

HORSE LABOUR.

During the year from December 1, 1903, to November 30, 1904, the work done by the 19 horses kept in the stables here was equivalent to 5,260 days work, distributed as follows:—Live stock, hauling feed, marketing stock, &c., 109 3-10 days ; farm work (200 acre farm), 722 8-10 days ; draining and care of roads, including removing snow and breaking roads in winter, 92 days ; manure on 200 acre farm, 261 6-10 days ; cleaning land, gathering stones, &c., 84 5-10 days; arboretum, 169 5-10 days; horticultural division, 611 5-10 days; lawns, &c., 160 5-10 days; experimental division, 586 days ; bulletins and reports to and from farm office, 100 days ; poultry, 8 1-10 days ; mail, including milk delivery, 171 7-10 days ; omnibus service, including 3 horses for omnibus, 2 horses for general driving and 1 horse for supervision of work, 2,122 days; work about greenhouse, outbuildings, sidewalks, exhibitions, &c., 60 5-10 days.

In estimating the cost of farming operations further on in this report, $2.50 per day is charged for team and driver. To feed and care for the horses, cost 37 cents per

horse per working day, and the driver received $1.41⅔ per day. It is evident therefore that the team and driver cost $2.16 per day, leaving a margin of 32 cents, or 16 cents per horse per day for wear and tear.

FEEDING HEAVY HORSES.

Several experiments in feeding heavy horses have been conducted during the year.

Not infrequently oats are high-priced when bran is cheap. During the past year chopped oats have usually sold for from $24 to $26 per ton on the Ottawa markets. Bran has been as low as $15 per ton.

To the man with many horses to feed, economy in the meal part of the ration is a most important consideration. For that reason one of the experiments was conducted for the purpose of finding out if bran could be used to any considerable extent as a substitute for oats.

The horses, 12 in number, were divided into 6 groups of 2 each; the roughage ration in each case being oat hay.

Group 1 received a meal mixture of equal parts of oats and bran; group 2, 1 part bran to 2 parts oats; group 3, 2 parts bran to 1 part oats; group 4, pure oats; group 5 oil meal 1 part, oats 10 parts; and group 6, bran 2 parts, oil meal 1 part, and oats 10 parts. The oats were ground in every case, and the ground oats or other meal and ground oats were mixed with the cut hay and the whole mass dampened.

The meal was fed in three nearly equal portions morning, noon and night, while only about one-fifth of the hay was fed in the morning, as much at noon, and the balance or three-fifths at night.

To illustrate, one of the horses in group 1 received his rations as follows:—

Morning, hay, 3 lbs.; meal mixture, 6 lbs.

Noon, hay, 3 lbs.; meal mixture, 6 lbs.

Evening, hay, 8 lbs.; meal mixture, 5 lbs.

The meal mixture and cut oat hay being mixed together and slightly dampened in each case.

BRAN FEEDING EXPERIMENT—OAT HAY.

Group.	Average weight Sept. 25.	Meal Ration, kind.	Hay (all fed on oat hay).	Amt. Meal Mixture fed in 40 days to 1 horse.	Amt. Oat Hay fed in 40 days.	Daily Meal Ration.	Daily Hay Ration.	Average weight Nov. 4.	Loss — or Gain +	Value of Food consumed in 1 day.	Value of Food consumed in 40 days.	Cost of Food for 1 year if such a meal ration were fed.	Cost of Food for 1 year if pure oats were fed.	Saving in 1 year by feeding such grain ration rather than pure oats.
									Lbs.	Cts.	$ cts.	$ cts.	$ cts.	$ cts.
1	1,488	Bran... 1 Oats.... 1	Oat hay.	680	580	17	14½	1,495	7+	22	8 80	80 30	89 06	8 76
2	1,604	Bran... 1 Oats.... 2	" ..	800	760	20	19	1,601	3—	27·98	11 19	102 12	111 83	9 71
3	1,685	Bran... 2 Oats.... 1	" ..	800	700	20	17½	1,649	36—	24·77	8 91	90 41	109 94	19 53
4	1,669	Oats.....	" ..	800	760	20	19	1,663	6—	39·65	12 26	111 87	111 87	
5	1,656	Oil meal 1 Oats....10	" ..	680	740	17	18½	1,622	34—	27·22	10 89	99 35	98 10	1.25 loss
6	1,673	Bran... 2 Oil meal 1 Oats....10	" ..	800	620	20	15½	1,624	49—	28·61	11 44	104 46	107 38	2 92

Group 1, on bran and oats equal parts, seemed to like their ration and did very well on it during the 40 days, making a gain of 7 lbs. each in that time. This is a meal mixture that may safely be fed by any owner of heavy horses, as they are practically certain to do well on it. It is much better adapted for feeding with timothy hay than is a ration of pure oats. Where bran was valued at $16 per ton and ground oats at $24, there would be a saving of $8.76 in the cost of feeding a horse for one year as compared with feeding pure oats.

Group 2, on bran 1 part and oats 2 parts, did very well on their ration and seemed to relish it.

Group 3, on bran 2 parts and oats 1 part, seemed fond of the meal mixture, but did not like the oat hay and consequently lost somewhat in weight. When timothy hay was substituted for the oat hay, however, this group came up in weight and did as well as any of the others. This mixture may be recommended as a good meal ration for working horses and is certainly very economical in comparison with pure oats, since there would be a saving of $19.53 in the year by feeding such a ration instead of an equal weight of pure oats.

Group 4, on pure oats did very well. Their ration, however, while not any heavier than that of several other groups cost 30·65 cents for the day or 2 cents more than the next most expensive.

Group 5, on oil meal 1 part, and oats 10 parts, seemed to enjoy their food but succeeded in losing 34 lbs. each in weight. Oil meal is usually found to give very good results and even in this case seemed to help keep the horses in good health and spirits. The price was against it, however, as it was found to have raised the cost of the ration slightly above what it would have been had pure oats been fed.

Group 6, on bran 2 parts, oil meal 1 part, and oats 10 parts, would be considered by most horsemen as being an ideal ration. They liked the meal very much but did not care for the oat hay. As soon as put on timothy hay they started to recover in weight very rapidly. Even though bran constituted such a small portion of the ration it more than overcame the extra cost of the oil meal and there was a slight saving over what would have been the cost had pure oats been fed, viz.: $2.92 in one year.

All the horses were on general farm work. Sometimes one team would for a few days be put at harder work than the others but things were fairly equal.

The oat hay had been cut a little on the ripe side and was not very palatable. A glance at the following table will show how the groups were affected by the change to timothy hay.

BRAN FEEDING EXPERIMENT—TIMOTHY HAY.

Group.	Average weight when starting oat hay, Sept. 25.	Average weight when finishing oat hay, Nov. 4.	Loss — or Gain + while on oat hay 40 days.	Average weight 10 days after being fed on timothy hay.	Average gain in 10 days after change from oat hay to timothy hay.	Meal Ration.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	
1	1,488	1,495	7+	1,507	12	Bran 1, oats 1.
2	1,604	1,601	3—	1,628	27	Bran 1, oats 2.
3	1,685	1,649	36—	1,668	17	Bran 2, oats 1.
4	1,669	1,663	6—	1,674	11	Oats.
5	1,656	1,622	34—	1,633	11	Oil meal 1, oats 10.
6	1,673	1,624	49—	1,656	32	Bran 2, oil meal 1, oats 10.

FEEDING ROOTS AND ENSILAGE TO WORKING HORSES.

The effect of feeding roots or ensilage to working horses has been studied during the year and a few points noted.

The roots experimented with were turnips, mangels and carrots, in addition one lot received ensilage as a part of their ration. A check lot receiving no feed other than the regular ration of hay, oats and bran was under feed at the same time.

The following table shows the amount of each kind of succulent food fed and the results so far as the gains or losses in weight of the horses are concerned.

Group.	Average weight Nov. 19.	Kind of roots fed 1 horse.	Amount fed in 14 days.	Average daily feed of roots.	Meal Ration, amt. fed in 1 day.	Hay (mixed), amt. fed in 1 day.	Average weight of horses Dec. 3.	Loss — or Gain +
								Lbs.
1	1,490	Carrots.	152	10	17	13	1,460	30—
2	1,625	Mangels.	92	6	18	15	1,610	15—
3	1,657	Turnips.	152	10	18	15	1,657	
4	1,595	Ensilage.	152	10	18	15	1,590	5—
5	1,625	... .	.....	.....	18	15	1,642	17+

As a general conclusion it may be stated that when such amounts of roots, &c., as are indicated in the table are fed horses working every day, the effect is not likely to be very good. The roots, &c., are laxative in character, hence any heavy exercise when receiving such food induces an undue looseness which is both unpleasant and injurious. There seemed to be but little preference in this respect among the feeds mentioned, and the only horses not suffering from this affection during the period of the experiment were the ones getting no succulent food.

Turnips and carrots seemed the most palatable of the four, with ensilage almost as welcome to the horses and mangels not at all in favour.

It was observed that fed in smaller amounts per day or fed to idle horses no evil effects were noticeable. The roots or ensilage did not seem to replace any of the regular ration of meal and hay and the feeding of these feeds was an added expense rather than an economy.

Where fed to idle horses, however, or where fed to horses it was desired to put in better condition, a small amount of roots—5 to 8 pounds per day—has been found beneficial, as serving to prevent digestion troubles.

DAIRY CATTLE.

The herd of dairy cattle during the year 1904 consisted of 28 females all told. They were:—

Ayrshires	6
Guernseys	5
Canadians	4
Shorthorns	3
Shorthorn grades	2
Ayrshire grades	4
Guernsey grades	3
Canadian grades	1

FEEDING THE DAIRY CATTLE.

One important consideration in feeding dairy cows is to make the ration not only as effective as possible as a milk-producing ration, but to make it as cheap as possible, and at the same time productive of good results. From the farmer's standpoint the most expensive part of the ration is the grain or meal part thereof. Our experience goes to show that with the use of clover hay and succulent food there is not the same, nor nearly the same need of a large proportion of meal in the ration as there is when either the one or the other of these most valuable milk-producing foods is lacking. When both are absent the amount of meal necessary to insure good returns from the cattle is so great as to render the profitable production of milk almost impossible in winter.

Both clover hay and succulent food are produced in abundance on the farm here and every advantage is taken of these, to the dairy farmer, invaluable feeds, to reduce the cost of producing milk.

Accordingly, the roughage ration fed to the cows consisted of ensilage, roots, (mangels and sugar-mangels), clover hay and some chaff.

The amount of roughage fed varies considerably, since the milch cows vary in weight from 800 lbs. to 1,600 lbs. The approximate roughage ration fed per 1,000 lbs. live weight is 35 lbs. ensilage, 20 lbs. mangels, 3 lbs. clover hay and a little chaff.

The meal mixture or grain ration consisted of different mixtures at different times and for different cows. Cows in heavy milk should receive a meal ration very rich in milk-forming material.

In feeding meal, even more than in feeding roughage, to dairy cows there is every opportunity for the careless or ignorant feeder to waste much valuable feed by feeding in too large quantities, or by feeding the wrong kind of meal or grain.

SUMMER FEEDING.

The cows were pastured as usual during the greater part of the summer months. They occupied one field of the three year rotation marked 'E' on page 82, and referred to there, as being under pasture in 1904. This field was able to carry about fifty head of cattle for over a month and over thirty head for over two months. When the pasture began to get bare it was supplemented by soiling crops cut and fed in the stables. A somewhat heavier grain ration was fed this year than usual on account of the greater extent to which soiling was carried on. The meal ration in summer consisted of oats and bran about equal parts. It was fed in amounts varying with the milk yield of the cows being fed, save in the case of heifers with their first calves which usually received more than their records seemed to call for as it was desired to encourage them and to cultivate in them the habit of maintaining a heavy and uniform flow of milk during the whole lactation period.

COST OF FEEDING.

In estimating the cost of feeding, the following prices were charged for feed stuffs, being the average local market rates for the same during the season of 1904, save in the case of ensilage and roots, which are charged for at the rate usually affixed in experimental feeding in all parts of America.

Pasture (per month)	$ 1 00	per cow.
Bran	16 00	per ton.
Gluten meal and oil meal	25 00	"
Oats and barley	21 00	"
Clover hay	7 00	"
Chaff	4 00	"
Roots and ensilage	2 00	"

In estimating the value of the product, 20 cents per pound is allowed for the butter and 15 cents per hundred pounds for the skim-milk and buttermilk. The butter

is manufactured in the farm dairy and sells on the market at from 22 to 30 cents per pound, an average of about 24 cents per pound during the last year. This leaves about 4 cents per pound for cost of manufacture.

The following tables give in detail the particulars concerning each cow, herd statements for each of the pure-bred herds, and monthly statements for all the herds combined.

The monthly statements for the whole milking herd show the total yield of milk for each month, its butter-fat content, the amount of butter produced, the number of pounds of milk required for a pound of butter, and the average yield of milk per cow per diem. The highest average per cent of fat was recorded in October and the lowest in January.

DAIRY CATTLE REPORTS.

During the year 28 different cows were milked for shorter or longer periods, as indicated on the first page of my report on dairy cattle, whereas in the subjoined 'herd reports' only 20 animals are reported upon.

In almost any dairy herd of any size some cows will be found that for some reason have given milk during only a very small part of any given year. Where a large number of cows are being considered, one or two such cases introduced in estimating the average does not materially affect the same, but where the herds to be compared are small the consideration of one or two such cases in one herd and no such cases in another makes an unjust difference in favour of the latter herd. To overcome this difficulty as far as possible, the records of three of the best cows in each herd, and of cows that had been in milk for the greater part of the year, have been taken, and the averages estimated from these records, rather than from the records of all cows of that particular breed that happened to calve during the year.

Report 1 is a summary of the more important points in connection with the year's work with the dairy herd.

Report 2 contains the individual records of all cows that gave milk during the year.

Reports 3, 4, 5, 6, 7, 8 and 9 give the herd records of the several pure-bred and grade herds under test.

REPORT 1.

GENERAL SUMMARY.

—	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	Total.
No. of cows giving milk for month..	26	26	24	20	24	25	25	28	28	26	25	25	
Lbs. of milk in month...	11,640	11,363	8,148	7,919	13,394	17,233	19,614	22,400	21,242	18,653	15,467	14,251	181,321
Average for 1 day.....	388	378·7	271·6	263·8	446·4	574·4	553·8	746·6	708	621·7	515·5	475	494·8
Daily average per cow....	14·92	14·56	11·31	13·19	18·60	22 97	22·15	26·66	25·28	23·91	20·62	19	18 59
Per cent fat..	4·67	4·84	4·79	4·48	4·20	4·26	4·28	4·27	4·13	4·04	4·20	4·57	4·41
Lbs. butter-fat.....	546·69	533·28	420·24	343·28	544·53	712·22	833 18	912·96	861·96	747·07	633·64	641 96	7761·01
Lbs. butter...	643·16	627·38	491·40	403·86	640·60	837·90	980·21	1109·36	1014·07	878·90	745·45	755·23	9130 60
Lbs. milk for 1 lb. butter.	18·09	18·11	16 48	19·60	20.90	20·50	20·01	20·19	20·94	21·22	20·74	18·86	19·85

REPORT 2.

INDIVIDUAL COW RECORDS.

Name of Cows.	Age.	Date of dropping last calf.	Number of days in milk.	Daily average yield of milk.	Total milk for year.	Per cent of fat in milk.	Pounds butter produced in year.	Value of butter at 29 cts. per lb.	Value of skim milk at 15 cts. per 100 lbs.	Total value of product.	Amount meal eaten, valued at 1c. per lb.	Amount of roots and ensilage eaten, valued at $2 per ton.	Amount hay, valued at $7 per ton.	Months on pasture at $1 per month.	Total cost of feed for year.	Cost to produce 100 lbs. milk.	Cost to produce 1 lb. butter, skim-milk neglected.	Profit on 1 lb. butter, skim-milk neglected.	Profit on cow during year, labour neglected.
			Days.	Lbs.	Lbs.	p. c.	Lbs.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Mos	$ cts.	Cts.	Cts.	Cts.	$ cts.
Queenie ... .(G.G.)	6	Apr. 5, '04	324	19·2	6,250	6·12	450·30	90 06	8 70	98 76	1,596	11,210	941	5	36 97	59·28	8·2	11·8	61 79
Fortune..... (C.)	8	Nov. 27, '04	335	26	8,734	4·56	468·60	93 72	10 89	104 61	2,359	11,960	941	5	45 35	51·92	9·7	10·3	59 26
Zamora.. ..... (C.)	8	May 24, '04	327	23·5	7,658	4 91	442·43	88 48	10 67	99 15	1,972	11,960	941	5	41 48	54·16	9·3	10·7	57 67
Jessie A ..... (A.)	16	Feb. 15, '04	313	32·2	10,086	3·77	447·85	89 57	14 45	104 02	2,486	12,120	941	5	46 78	46·38	10·4	9·6	57 24
Itchen Lady ..... (G.)	7	May 4, '04	294	26·6	7,782	4·50	412·39	82 47	11 05	93 52	1,906	11,815	941	5	40 67	52·26	9·8	10·2	52 85
Exilée..... (C.)	9	" 1, '04	334	25·8	8,628	4·10	416·90	83 38	12 31	95 69	2,214	11,960	941	5	43 90	51.21	10·5	9·5	51 79
Countess .. ..(A.G.)	6	Apr. 2, '04	324	25·4	8,258	4	389·41	77 88	11 89	89 77	1,952	11,810	941	5	41 13	49·80	12·1	7·9	48 64
Flossy Lyons..... (G.)	4	Feb. 25, '04	319	20	6,386	5·12	384·92	76 98	9 00	85 98	1,724	11,210	941	5	38 25	59·89	9·9	10·1	47 73
Maggie..... (A.)	8	Mar. 27, '04	300	28·6	8,595	3·76	381·03	76 20	12 02	88 22	1,965	11,810	941	5	41 22	47·09	10·9	9·1	47 00
Bellflower ..... (G.G.)	6	Apr. 15, '04	275	25·9	7,146	4·32	363·74	72 74	10 17	82 91	1,500	11,815	941	5	36 61	51·23	10·7	9·3	46 30
Polly ....(G.C.)	9	Mar. 24, '04	343	22·3	7,665	4·30	388·56	77 71	10 91	88 62	2,201	11,660	941	5	43 46	56·71	11·1	9·9	45 15
Denty ..... (A.)	5	Feb. 6, '04	284	27·1	7,672	4·06	367·28	73 45	10 95	84 40	1,834	11,965	941	5	40 10	52·27	10·9	9·1	44 30
Alma..... ...(G.G.)	3	" 28, '04	312	20·1	6,291	4·88	361·82	72 36	8 89	81 25	1,776	11,515	941	5	39 07	62·10	10·8	9·2	42 18
Deanie ... . (G.)	7	Aug. 22, '04	366	17·7	6,501	4·90	374·98	74 99	9 18	84 17	2,168	11,815	941	5	43 29	66·59	11·6	8·4	40 88
Ruby..... (G.)	7	Sept. 28, '04	321	18·9	6,084	5·07	363·14	72 62	8 58	81 20	1,982	11,515	941	5	41 13	67·60	11·4	8·6	40 07
Marchioness..... (S.)	10	Mar. 10, '04	321	18·8	6,054	3·75	267·59	53 51	8 68	62 19	1,919	12,332	941	5	41 32	51·30	12	8	20 87
Bloomer ..... (A.)	5	" 12, '04	326	22·4	7,311	3·93	338·10	67 62	9 75	77 37	1,775	11,810	941	5	39 36	57·51	11·6	8·4	38 01
Alice.. .....(G.A.)	3	" 20, '04	352	19·1	6,750	3·87	307·32	61 22	9 66	70 88	1,613	11,480	941	5	37 35	55·33	12·1	7·9	33 53
Laura..... .....(G.A.)	8	Feb. 9, '04	291	27·5	8,037	3·65	309·90	61 98	11 59	73 57	1,978	11,815	941	5	41 39	51·49	13·3	6·7	32 18
Rosy..... .....(G.S.)	5	Oct. 5, '03	366	20·7	7,604	3·65	327	65 40	10 91	76 31	2,253	11,815	941	5	44 14	58·05	13·5	6·5	32 17
Janet..... (S.)	3	Nov. 14, '03	290	13·81	5,505	4·4	284·96	56 99	7 83	64 82	2,198	11,815	941	5	43 59	79·18	15·3	4·7	21 23
Gurta .... (A.)	4	" 6, '03	328	18·6	6,130	3·67	265·19	53 03	8 79	61 82	1,923	11,815	941	5	40 84	66·62	15·4	4·6	20 98
Duchess.. ..... (S.)	3	Dec. 13, '03	275	16·56	4,556	4·15	222·44	44 48	6 49	50 97	1,883	10,525	941	5	37 62	82·57	16·9	3·1	13 35
Cherry .... (G.S.)	4	Sept. 14, '04	303	14·8	4,502	4·30	227·98	45 59	6 41	52 00	1,864	11,815	941	5	40 25	89·	17·6	2·4	11 75
Flecky .... (A.)	5	Mar. 14, '04	314	15·1	4,759	3·78	212·06	42 41	6 82	49 23	1,861	11,660	941	5	40 13	84·32	18 9	1·1	9 10
Clatford Spot .... (G.)	10	June 21, '04	308	14·09	4,342	4·27	218·55	43 71	6 18	49 89	2,346	12,125	941	5	45 38	1·04	20·8	.....	4 51
Alvina ..... .(G.A.)	3	May 22, '04	143	15·5	2,217	4·79	125·05	25 01	3 13	28 14	797	7,500	941	5	25 21	1·13	20·1	.....	2 93
Duchesse..... (C.)	3	July 21, '04	264	14·03	3,705	3·78	164·93	32 98	5 31	38 29	1,399	11,660	941	5	35 45	95·63	21·5	.....	2 84
Average		....	309	.....	6,614⅞	.....	331·58	66 30	9 32	75 63	1,908½	11,582½⅛	929½	5	40 41	.....	.....	.....	35 22

SHORTHORNS.

Name of Cows.	Age.	Date of dropping last calf.	Number of days in milk.	Daily average yield of milk.	Total milk for year.	Per cent of fat in milk.	Pounds of butter produced in year.	Value of butter at 20 cents per lb.	Value of skim-milk at 15 cents per 100 lbs.	Total value of products.	Amount of meal eaten, valued at 1c. per lb.	Amount of roots and ensilage eaten, valued at $2 per ton.	Amount of hay, valued at $7 per ton.	Months on pasture at $1 per month.	Total cost of feed for year.	Cost to produce 100 lbs. of milk.	Cost to produce 1 lb. butter, skim-milk neglected.	Profit on 1 lb. butter, skim-milk neglected.	Profit on cows during year, labour neglected.	Sex of calf dropped during the year.	Value of calf, or price for which it sold.	Total returns from cow, milk and calf.
			Days.	Lbs.	Lbs.	p. c.	Lbs.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Mos	$ cts.	Cts.	Cts.	Cts.	$ cts.		$ cts.	$ cts.
Marchioness.. (S)	10	Mar. 10, '04	321	18·8	6,054	3·75	267·59	53 51	8 68	62 19	1,919	12,332	941	5	41 32	51·30	12·0	8·0	20 87	Heifer.	v. 75 00	137 19
Janet	3	Nov. 14, '03	290	13 81	5,505	4·4	284·96	56 99	7 83	64 82	2,198	11,815	941	5	43 59	79·18	15·3	1·7	21 23	Bull...	s. 100 00	164 82
Duchess	3	Dec. 13, '03	275	16·56	4,556	4·15	222·44	44 48	6 49	50 97	1,883	10,525	641	5	37 62	82 57	16·9	3·1	13 35	" ...	v. 100 00	150 97
Average	..		295	16·39	5,335	4·10	258·33	51 66	7 66	59 32	2,000	11,557	841	5	40 84	71·01	14·7	5·2	21 82		91 66	150 99

AYRSHIRES.

Jessie A	10	Feb. 15, '04	313	32·2	10,086	3 77	447·85	89 57	14 45	104 02	2,486	12,120	941	5	46 78	46·38	10·4	9·6	57 24	Heifer.	v. 75 00	179 02
Maggie	8	Mar. 27, '04	300	28·6	8,595	3·76	381·03	76 20	12 02	88 22	1,965	11,810	941	5	41 22	47·09	10·9	9·1	47 00	" ...	v. 50 00	138 22
Denty	5	Feb. 6, '04	284	27·1	7,672	4·06	367·28	73 45	10 95	84 40	1,834	11,965	941	5	40 10	52·27	10·9	9·1	44 30	2 bulls.	s. 55 00	139 40
Average	..		299	29·3	8,784	3·86	398·72	79 74	12 47	92 21	2,095	11,965	941	5	42 70	48·58	10 7	9·2	49·51		60 00	152 55

GUERNSEYS.

Itchen Lady	7	May 4, '04	294	26·6	7,782	4·50	412·39	82 47	11 05	93 52	1,906	11,815	941	5	40 67	52 26	9·8	10·2	52 85	Bull...	s. 30 00	123 52
Flossy Lyons	4	Feb. 25, '04	319	20	6,386	5·12	384·92	76 98	9 00	85 98	1,724	11,210	941	5	38 25	59 89	9 9	10·1	47 73	Heifer.	v. 35 00	120 98
Deanie	7	Aug. 27, '01	466	17·7	6,501	4·90	374·98	74 99	9 18	84 17	2,168	11,815	941	5	43 29	66 59	11·6	8·4	40 88	Bull...	s. 25 00	109 17
Average	..		359	21·4	6,889	4·84	390·76	78·14	9·74	87·89	1,932	11,613	941	5	40 73	59 58	10·4	9·5	47 15		30 00	117 89

CANADIANS.

Fortune d'Oka	8	Nov. 27, '04	335	26	8,734	4·56	468·60	93 72	10 89	104 61	2,359	11,960	941	5	45 35	51 92	9·7	10·3	59 26	Bull...	s. 30 00	123 72
Zamora	8	May 24, '04	327	23·5	7,658	4·91	442·43	88 48	10 67	99 75	1,972	11,960	941	5	41 48	54 16	9 3	10·7	57 67	Heifer.	v. 50 00	138 48
Exilee	9	" 1, '04	334	25·8	8,628	4·10	416·90	83 38	12 31	95 69	2,214	11,960	941	5	43 90	51 21	10·5	9·5	51 79	Bull...	s. 25 00	108 38
Average	..		332	25·1	8,340	4·52	442·64	88·52	11 29	99 81	2,181	11,960	941	5	43 57	52 43	9·8	10·1	56 24		35 00	123 52

SHORTHORN GRADES.

Name of Cows.	Age.	Date of dropping last calf.	Number of days in milk.	Daily average yield of milk.	Total milk for year.	Per cent of fat in milk.	Pounds of butter produced in year.	Value of butter at 20c. per lb.	Value of skim-milk at 15c. per 100 lbs.	Total value of product.	Amount of meal eaten, valued at 1c. per lb.	Amount of roots and ensilage eaten, valued at $2 per ton.	Amount of hay, valued at $7 per ton.	Months in pasture at $1 per month.	Total cost of food for year.	Cost to produce 100 lbs. milk.	Cost to produce 1 lb. butter, skim-milk neglected.	Profit on 1 lb. butter, skim-milk neglected.	Profit on cow during year, labour neglected.	Sex of calf dropped during year.	Value of calf or price for which it sold.	Total returns from cow, milk and calf.
			Days.	Lbs.	Lbs.	p. c.	Lbs.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Mos.	$ cts.	$ cts.	Cts.	Cts.	$ cts.		$ cts.	$ cts.
Rosy	5	Oct. 5, '03	366	20·7	7 604	3·65	327	65 40	10 91	76 31	2,253	11,815	941	5	44 14	58 05	13·5	6·5	32 17	Bull	5 00	81 31
Cherry	4	Sept 14, '04	303	14·8	4,502	4·30	227·98	45 59	6 41	52 00	1,864	11,815	941	5	40 25	89 00	17·6	2·4	11 75	"	5 00	57 00
Average			334	17·7	6,053	3·97	277·49	55 49	8 66	64 15	2,058	11,815	941	5	42 19	73 52	15·5	4·4	21 96		5 00	69 15

AYRSHIRE GRADES.

Countess	6	Apl. 2, '04	324	25·4	8,258	4·	389·41	77 88	11 89	89 77	1,952	11,810	941	5	41 13	49 80	12·1	7·9	48 64	Heifer	5 00	94 77
Alice	3	Mar. 20, '04	352	19·1	6,750	3·87	307·32	61 22	9 66	70 88	1,613	11,480	941	5	37 35	55 33	12·1	7·9	33 53	Bull	.....	70 35
Laura	8	Feb. 9, '04	291	27·5	8,037	3·65	309·90	61 98	11 59	73 57	1,978	11,815	941	5	41 39	51 49	13·3	6·7	32 18	"	.....	73 57
Average			322	24	7,681	3·84	335·54	67 02	11 04	78 07	1,847	11,701	941	5	39 95	52 20	12·5	7·5	38 11		5 00	79 74

GUERNSEY GRADES.

Queenie	6	Apr. 5, '04	324	19·2	6,250	6.12	456·30	90·06	8·70	98·76	1,596	11,210	941	5	36·97	59·28	8·2	11·8	61·79	Bull	.....	98·76
Bellflower	6	Apr. 15, '04	275	25·9	7,446	4·32	363·74	72·74	10·17	82·91	1,500	11,815	941	5	36·61	51·23	10·7	9·3	46·30	"	.....	82·91
Alma	3	Feb. 28, '04	312	20·1	6,291	4·88	361·82	72·36	8·89	81·25	1,776	11,515	941	5	39·07	62·10	10·8	9.2	42·18	Heifer	2 00	83·25
Average			303	21·7	6,562	5·10	391·95	78·38	9.25	87·64	1,624	11,546	941	5	37·35	57·53	9·9	10·1	50·02		2 00	88·30

DAILY RECORDS.

The effort to interest dairymen in the returns from their individual cows has been continued, and many farmers seem to be awakening to a knowledge of the fact that the improvement of the whole herd demands the study of the unit; that is, a close acquaintance with the expenditure upon the individual cow and the returns from the same.

This can be determined in no other way than by keeping an exact record of the daily milk yield and the daily food consumption.

Forms, similar to the following, for keeping a record of the milk yield are still supplied free on application.

DAIRY MILK RECORD.

Herd belonging to .....
Post Office.....
Record for week ending .....

(This form supplied free by Live Stock Division, Central Experimental Farm, Ottawa, Ont).

COWS.

Day.	Time.																		Total for Day.
Sunday.	Morning																		
	Evening																		
Monday	Morning																		
	Evening																		
Tuesday	Morning																		
	Evening																		
Wednesday	Morning																		
	Evening																		
Thursday	Morning																		
	Evening																		
Friday	Morning																		
	Evening																		
Saturday	Morning																		
	Evening																		
Total	Week																		

(Reverse.)

CENTRAL EXPERIMENTAL FARM.

WM. SAUNDERS, *Director.* J. H. GRISDALE, *Live Stock and Agriculture.*

MILK RECORDS.

1. The profitable dairy cow must give over 5,000 pounds of milk each year. To know the value of a cow her total annual yield of milk must be known. The only way to know this is to keep a record of her daily milk yield.

2. The form on the other side of this sheet is intended to help progressive dairy farmers by supplying them with a simple and convenient sheet for the keeping of the milk records of their individual cows. A study of such records will soon indicate which cows should go to the butcher. We would be pleased to receive a summary of your record. If you have no summary forms write us.

3. Such records are being kept by hundreds of successful dairymen to-day. Many of these men attribute their success to the keeping of such records. Why not give the

thing a trial if you are a dairyman? It will increase your milk product. It will lighten your labour, since your interest will be increased in your work, and 'interest lightens labour.' It will show you the unprofitable cow the 'boarder.' You cannot get rid of her too quickly.

4. For weighing the mik a simple spring balance may be secured for from one to three dollars. If your local dealer cannot supply you, write the undersigned for particulars. A small platform scale is fairly convenient, but we find the spring balance preferable.

5. Many farmers keep records of the amount of food fed to individual cows. If you would like to do so, sample forms would be sent free on writing J. H. Grisdale, Agriculturist, Central Experimental Farm, Ottawa, Ont.

EXPERIMENTS WITH DAIRY COWS.

In reporting upon the following experiments with dairy cows, a few introductory remarks are submitted, a careful reading of which will help in understanding the results.

A careful examination of the daily milk records of many cows shows that for from 2 to 3 months the milk flow increases or remains nearly uniform; for the next 3 or 4 months the decrease is at the rate of about 10 per cent, and then till the end of the lactation period the rate of decrease seems to vary very much, some cows decreasing very rapidly, and others very slowly indeed. It is, therefore, rather difficult to say what the normal rate of decrease in milk flow in a given group of cows really should be, even though the dates of calving were known. It would probably be safe, however, to say that 10 per cent per month was the regular rate of decrease, and taking that rate as the basis, some idea of the influence of the different feeds on the milk flow may be formed.

In estimating the values of rations, hay is charged at $7 per ton; ensilage, turnips, mangels and sugar mangels at $2; sugar beets at $3 per ton, and meal at $20 per ton.

The cows in the different experiments were in some cases dry, in other cases far advanced in the lactation period, and in other cases newly calved.

ENSILAGE *VS.* MANGELS.

The cows in these groups were all fairly well advanced in lactation and the experiment was in every way satisfactory, no mishap or untoward circumstance arising. It will be observed that while the mangels were practically no better milk producers than the ensilage, the mangel ration cost 1·2 cents more per diem than the ensilage ration. The table is self-explanatory. The 'summaries' are the averages of the results of group 'C' on mangels and group 'D' on mangels, and the same when on ensilage.

		Method of Feeding.							
		1st period of 2 weeks.		2nd period of 2 weeks.		3rd period of 2 weeks.		Summaries.	
		Group C.	Group D.	Group C.	Group D.	Group C.	Group D.		
		Number in group, 4.	Number in group, 4.	Number in group, 4.	Number in group, 4.	Number in group, 4.	Number in group, 4.	Summary.	Summary.
		Regular Ration.	Regular Ration.	Ensilage, Hay, Meal.	Mangels, Hay, Meal.	Mangels, Hay, Meal.	Ensilage, Hay, Meal.	Mangels, Hay, Meal.	Ensilage, Hay, Meal.
Average weight to start	Lbs.	.....	.....	1,024	922	1,044	941	983	982
Average weight at end of 2 weeks	"	.....	.....	1,044	941	1,071	969	1,006	1,006
Loss — or gain +	"	.....	.....	+ 20	+ 19	+ 27	+ 28	+ 23	+ 24
Meal fed group in 1 day	"	32	31	30	30	28½	29	29¼	29½
Hay fed group in 1 day	"	12	12	20	20	20	20	20	20
Ensilage and roots fed group in 1 day	"	200	190	.....	.....	.....	.....	.....	.....
Ensilage fed group in 1 day	"	.....	.....	222	.....	.....	178	271	200
Mangels fed group in 1 day	"	.....	.....	.....	277	265	.....	.....	.....
Meal fed in 2 weeks	"	448	434	420	420	399	406	409	413
Hay fed in 2 weeks	"	168	168	280	280	280	280	280	280
Ensilage and roots in 2 weeks	"	2,800	2,660	.....	.....	.....	.....	.....	.....
Mangels in 2 weeks	"	.....	.....	.....	3,880	3,710	.....	3,795	.....
Ensilage in 2 weeks	"	.....	.....	3,105	.....	.....	2,495	.....	2,800
Value of food fed group in 2 weeks	$	7·87	7·59	8·28	9·06	8·68	7·53	8·87	7·91
Value of food fed 1 cow in 1 day	Cts.	14	13·5	14·8	15·3	15·5	13·5	15·4	14·2
Milk produced by group in 2 weeks	Lbs.	1,204	1,162	1,015½	1,041½	972	991	1,007	1,003
First day's milk from group	"	87½	82	80	79	71½	72½	75	71
Second day's milk from group	"	85½	84½	82½	78½	72	73	75	73
Average daily yield of group during 1st week	"	87	85	75½	75½	70½	70¾	73	73
Average daily yield of group during 2nd week	"	84	82	70	73	69½	70¾	71	70½
Average daily yield of group during 2 weeks	"	86	83¾	72½	74¼	70	70¾	72	71½
Next to last day's milk from group	"	83	80	69	74	68	68	73	68½
Last day's milk from group	"	82	76½	73	74	68	70	73	71½
Decrease in rate of daily milk yield in 2 weeks	"	3	5	10	5	4	3	4½	6½
Per cent decrease in rate of daily milk yield	p. c.	3½	6	12½	6	5½	4	5½	8

The cows in group 'E' and 'F' seemed to like the dry forage fairly well, and the group ate about 25 per cent more dry matter when so fed, but the yield of milk fell off very rapidly.

The results seem to indicate quite strongly the advisability of every dairy farmer having some succulent feed to give to his milch cows in addition to the hay and meal.

DRY FORAGE vs. SUCCULENT FORAGE.

—		Method of Feeding.							
		1st period of 2 weeks.		2nd period of 2 weeks.		3rd period of 2 weeks.		Summaries.	
		Group E.	Group F.	Group E.	Group F.	Group E.	Group F.	Summary.	Summary.
		Number in group, 4.	Number in group, 4.	Number in group, 4.	Number in group, 4.	Number in group, 4.	Number in group, 4.		
		Roots and Ensilage, Meal, Hay.	Roots and Ensilage, Hay, Meal.	Dry Feed.	Succulent Feed.	Succulent Feed.	Dry Feed.	Dry Feed.	Succulent Feed.
Average weight to start	Lbs.	.....	.....	994	972	1,007	1,049	1,022	988
Average weight at end of 2 weeks	"	.....	.....	1,007	1,004	1,049	1,016	1,011	1,027
Loss or gain, -+	"	.....	.....	+13	+32	+42	−33	−11	+39
Meal fed group in 1 day	"	30	29	31	30½	29	30	30½	29¾
Hay "	"	12	12	82	20	20	80	81	20
Ensilage and roots fed group in 1 day	"	200	190	.....	252	242	.....	.....	247
Meal fed in 2 weeks	"	420	406	434	427	406	420	427	416
Hay "	"	168	168	1,150	280	280	1,120	1,135	280
Ensilage and roots fed in 2 weeks	"	2,800	2,660,	.....	3,530	3,388	.....	.....	3,459
Value of food fed group in 2 weeks	$	7 59	7 25	8 37	8 78	8 42	8 12	8 25	8 60
" 1 cow in 1 day	Cts.	13·5	12·75	15	15·6	15	14·7	14·9	15·3
Milk produced by group in 2 weeks	Lbs.	1,286	1,023½	998	888½	944	819	906	916
First day's milk from group	"	92½	73	90	68	70	60½	75	69
Second "	"	93½	75	85½	68	70½	60½	73	69¼
Average daily yield of milk from group during 1st week.	"	95	74⅜	77½	66	69	58	68	67⅝
" " " 2nd " .	"	90	71¾	65	61¾	66	56	60½	64
" " " 2 weeks..	"	92	73¼	71¼	62	67½	57½	64½	65
Next to last day's milk from group	"	89½	69½	67	62½	65½	56	61½	64
Last day's milk from group	"	87	69	69	62½	65½	55	62	64
Decrease in rate of daily milk yield in 2 weeks	"	5	5	20	5½	4½	5	13	5
Per cent decrease in rate of daily milk yield	p. c.	5½	6⅔	22	8	6½	8½	17	7

ROOTS AND ENSILAGE, TURNIPS AND SUGAR MANGELS

and

ROOTS AND ENSILAGE, SUGAR MANGELS AND SUGAR BEETS.

The experiments with sugar beets, sugar mangels and turnips may hardly be said to be as instructive as the previous experiments. They were not carried out quite so fully for two reasons: the supply of sugar beets was quite limited, and the effects of the turnips on the butter was very injurious.

So far as turnips are concerned, the results show them more expensive than ensilage and roots and not much more effective, since the natural rate of decrease is not retarded. They were fed in large quantities and rendered the butter quite unsaleable When fed after the milk was drawn night and morning the effect was not quite so noticeable but still sufficient to render the butter unpalatable.

Sugar beets was the only succulent food fed that succeeded in entirely overcoming the normal rate of decrease and in even turning it into an increase of about 3½ per cent in two weeks. But the cost was increased although the amount fed was less than in the case of sugar mangels.

ROOTS AND ENSILAGE, TURNIPS, SUGAR MANGELS AND SUGAR BEETS.

—	Method of Feeding.					
	Group G.			Group H.		
	1st Period.	2nd Period	3rd Period	1st Period.	2nd Period	3rd Period
	Regular Ration.	Turnips, Hay, Meal	Sugar, Mangels, Hay, Meal	Regular Ration.	Sugar Mangels, Hay, Meal	Sugar Beets, Hay. Meal
	Number in group, 4.	Number in group, 4.	Number in group, 4.	Number in group, 3.	Number in group 3.	Number in group 3.
Average weight to start.....Lbs	.....	1,009	1,016	.....	1,003	1,062
Average weight at end of 2 weeks.. "	.....	1,016	1,051	.....	1,002	1,037
Loss — or gain + ... "	.....	+7	+35	.....	—1	+35
Meal fed group in 1 day..... "	30	25½	23	22	22½	20
Hay " " ..... "	12	20	20	9	15	15
Roots and ensilage fed group in 1 day "	200	.....	.....	150	.....	.....
Sugar mangels " " "	.....	.....	280	.....	218	.....
Turnips " " "	.....	277	.....	.....	.....	.....
Sugar beets " " "	.....	.....	.....	.....	.....	210
Meal fed in 2 weeks..... "	420	357	322	308	315	280
Hay " ..... "	168	280	280	126	210	210
Roots and ensilage fed in 2 weeks.. "	2,809	.....	.....	2,100	.....	.....
Sugar mangels " .. "	.....	.....	3,920	.....	3,050	.....
Sugar beets fed in 2 weeks ..... "	.....	.....	.....	.....	.....	2,940
Turnips " " ..... "	.....	3,880	.....	.....	.....	.....
Value of food fed group in 2 weeks. $	7.59	8.43	8.12	5.62	6.94	7.94
" " 1 cow in 1 day.... Cts.	13·5	15	14·5	13·3	16·5	18·8
Milk produced by group in 2 weeks Lbs.	928	806	692½	836½	760	835½
First day's milk from group..... "	71½	69½	54	60½	59	57½
Second " " ..... "	71	59½	55	63	57	58½
Average daily yield of group during 1st week ..... "	68¼	61	50½	61½	55½	58
Average daily yield of group during 2nd week..... "	64½	54	48½	57¾	54	61½
Average daily yield of group during 2 weeks. ..... "	66¼	57¾	50	60	54	60
Next to last day's milk from group "	64	53	48½	57	54	60½
Last day's milk from group..... "	62½	55	48	58	56	60
Decrease in rate of daily milk yield in 2 weeks..... "	8	6	6	4½	1	increase 2
Per cent decrease in rate of daily milk yield..... .....p. c.	11	10	11	7	1½	3½

TWO FEEDS *vs.* THREE FEEDS DAILY.

It is the regular practice here to feed the dairy cows as well as all other cattle twice a day as follows:—roots, ensilage and meal at 5.30 o'clock, first thing in the morning, followed by hay in about an hour and a half, in the afternoon about 3.30 o'clock the other half of the roots and ensilage and meal is given, and shortly after 5 o'clock the rest of the hay is fed. The meal is mixed with the roots and ensilage after it is before the animal and the hay is fed uncut.

Many feeders claim that it is better to feed three times in the day rather than twice even though no more food be fed. The following experiment would seem to indicate that two feeds a day is quite as effective as three feeds.

In lot 'B' one of the cows calved during the preliminary or check fortnight, but as this happened before the real experiment began, it does not affect the results as each group is fed each way.

	Method of Feeding.						Summaries.	
	1st period of 2 weeks.		2nd period of 2 weeks.		3rd period of 2 weeks.			
	Group A.	Group B.	Group A.	Group B.	Group A.	Group B.	Summary.	Summary.
	2 feeds.	2 feeds.	2 feeds a day.	3 feeds a day.	3 feeds a day.	2 feeds a day.	3 feeds.	2 feeds.
	Number in group, 4.	Number in group, 4.	Number in group, 4.	Number in group, 4.	Number in group, 4.	Number in group, 4.	Number in group, 4.	Number in group, 4.
Average weight to start			1,442½	1,212½	1,461	1,226	1,337 lbs.	1,334
Average weight at end 2 weeks			1,461	1,226	1,462	1,227	1,344 "	1,344
Loss — or gain +			+19	+14	+1	+1	+7 "	+10
Meal fed group in 1 day	29	27	24½	28½	25	28	26½ lb.	26¼
Hay " "	12	12	20	20	20	20	20	20
Ensilage and roots fed group in 1 day	200	180	277	276	237	250	256	263
Mangels " "								
Turnips " "								
Sugar beets " "								
Sugar mangels " "								
Ensilage " "								
Meal fed group in 2 weeks	406	378	542	399	350	392	374	367
Hay " "	168	168	280	280	280	280	280	280
Ensilage and roots fed group in 2 weeks	2,800	2,520	3,881	3,861	3,320	3,498	3,590	3,689
Value of feed fed group "	$7 45	$6 89	$8 28	$8 83	$7 80	$8 40	$8 32	$8 34
Value of feed fed 1 cow in 1 day	13·25	12·3	14·1cts.	15·8cts.	14cts.	15cts.	15 cts.	14·5
Milk produced by group in 2 weeks	334	529	289 lbs.	743	235	724	439	566
First day's milk from group	26½	39½	22 "	54	18	53	36	37½
Second " "	26	39½	21 "	53½	19	52½	36	37
Average daily yield of group during 1st week	25½	39	21½ "	53¾	17	51½	35½	36½
" " 2nd "	22	36¼	19½ "	52¼	16½	52	34½	36
" " 2 weeks	24	37¾	20¾ "	53	16¾	51¾	34½	36
Next to last day's milk from group	22	33½	19 "	51½	16	50½	34	35
Last day's milk from group	22	33½	18 "	55½	15	51	35	34½
Decrease in rate of daily milk yield in 2 weeks	4	6	2 "	—0	3	1	1½	1½
Per cent decrease in rate of daily milk yield	16%	15%	9%		16⅔%	2%	8⅓%	6⅔%

REFUSE APPLES AS FEED FOR MILCH COWS.

Every season the disposition to be made of low grade apples is a matter of more or less moment to many farmers. To be in a position to give some exact data as to their value as food for at least some classes of live stock, a few experiments in feeding them were conducted here in the autumn. Among others was one to study their effect upon milk secretion and upon the health of dairy cattle.

Four grade cows about six months in milk were selected. They were fed on the usual ration of ensilage, pulped roots and hay for two weeks, then put on a ration of meal, hay, ensilage and roots and apples.

Below are submitted a few particulars.

FIRST PERIOD.

NO APPLES.

Number of cows in experiment		4
Average ration fed each cow during 2 weeks previous to apple feeding experiment and 2 weeks after apple feeding experiment.	Ensilage and roots	50 lbs.
	Hay	4 "
	Meal	7½ "
Feed consumed by group in average 2 weeks	Ensilage and roots	2,800 "
	Hay	224 "
	Meal	420 "
Value of feed in average 2 weeks		$ 7.78
Cost to feed 1 cow 1 day		13·9 cts.
Milk yielded by group in average 2 weeks		1,353 lbs.
Daily average for cow during 2 weeks		24·2 "

SECOND PERIOD.

APPLES IN RATION.

Average ration for each cow during 2 weeks on experiment	Apples	25 "
	Roots and ensilage	20 "
	Hay	4 "
	Meal	7½ "
Feed consumed by group in 2 weeks while experiment lasted	Apples	1,400 "
	Roots and ensilage	1,120 "
	Hay	224 "
	Meal	420 "
Value of feed, other than apples, fed during 2 weeks		$ 6.10
Cost to feed one cow 1 day (apples not valued)		10·9 cts.
Milk yielded by group in 2 weeks while eating apples		1,395 "
Daily average for cow during 2 weeks		24·9 "
Difference in milk yield in favour of apple ration, for 2 weeks		42 "
Average weight of cows when going on apple feeding period		985 "
Average weight of cows at end of apple feeding period		1,008 "
Gain in weight on average		23 "
Average weight at end of last 2 weeks		992 "
Loss in average weight during 2 weeks		16 "

It is only fair to credit the refuse apples as being worth the value of the food saved in the 2 weeks. On such a basis, therefore, refuse apples may be valued at $2.40 per ton, or about 7 cents per bushel, when roots and ensilage are valued at $2 per ton for cattle feed.

By way of comment it might be added that the cows seemed to relish the apples, which were of different sorts, and to thrive upon them as shown by the quite considerable gain of 23 pounds per cow made in 14 days while on apples, whereas during the subsequent 2 weeks a loss of 16 pounds per cow is shown. The health of the cows seemed to be very favourably affected by the apples, as might be inferred from the above.

Calves given a few of the apples each day seemed to like them, and did well on them.

BEEF PRODUCTION.

EXPERIMENTS IN 1903-4.

The lines of experiment followed in the winter of 1903-4 were:—Influence of age on cost of beef; influence of manner of housing, *i.e.*, feeding loose vs. feeding tied; baby beef; values of feeds.

On the whole the steer feeding operations may be considered successful from the financial point of view since the selling price covered the cost of the steers, the cost of the feed at market prices, and left a fair margin for profit. Full particulars are given in the group reports.

In conducting feeding operations the farmer may seldom expect to make much over and above market prices for his feeds, but he will, of course, have saved himself the trouble of marketing the feeds and will have retained on his farm a large amount of material for fertilizing purposes without which it is practically impossible to long farm successfully in Canada.

LOOSE VS. TIED.

The experiment of feeding lots of steers loose as compared with feeding similar lots tied has been continued as indicated above and is concluded. The results in 1903-4 are decidedly in favour of loose box feeding. The loose box fed lots gained on the average 311 pounds per steer in 129 days, while the tied steers gained 275 lbs. in 129 days. The loose box steers put on flesh at a cost of $4.76 per 100 lbs., while the tied lots cost $5.39 per 100 lbs. gain in live weight.

Lot 'A'—(Three-year-olds)—Loose.

Number of steers in lot	8	
First weight, gross	9,888	lbs.
First weight, average	1,236	"
Finished weight, gross	12,240	"
Finished weight, average	1,530	"
Total gain in 129 days	2,352	"
Average gain per steer	294	"
Daily gain for lot, 8 steers	18·24	"
Daily gain per steer	2·28	"
Gross cost of feed	$ 122 89	
Cost of 100 pounds gain	5 22	
Cost of steers, 9,888 lbs. at $4 per 100 lbs.	395 52	
Total cost to produce beef, $395.52 + $122.89	518 41	
Sold, 12,240 lbs. at $5 per 100 lbs., less 5 per cent.	581 40	
Profit on lot	62 99	
Net profit per steer	7 87	
Average buying price per steer	49 44	
Average selling price per steer	72 67	
Average increase in value	23 23	
Average cost of feed per steer	15 36	

Amount of meal eaten by lot of 8 steers	4,127 lbs.
Amount of ensilage and roots	49,728 "
Amount of hay	6,328 "
Amount of straw eaten	4,872 "

Lot 'B'—(Three-year-olds)—Tied.

Number of steers in lot	9
First weight, gross	11,097 lbs.
First weight, average	1,233 "
Finished weight, gross	13,563 "
Finished weight, average	1,507 "
Total gain in 129 days	2,466 "
Average gain per steer	274 "
Daily gain for lot, 9 steers	19·03 "
Daily gain per steer	2·12 "
Gross cost of feed	$ 137 78
Cost of 100 pounds gain	5 59
Cost of steers, 11,097 lbs. at $4 per 100 lbs.	443 88
Total cost to produce beef, $443.88 + $137.78	581 66
Sold, 13,563 lbs. at $5 per 100 lbs., less 5 per cent.	644 25
Profit on lot	62 59
Net profit per steer	6 95
Average buying price per steer	49 32
Average selling price per steer	71 58
Average increase in value	22 26
Average cost of feed per steer	15 31
Amount of meal eaten by lot of 9 steers	4,662 lbs.
Amount of ensilage and roots	55,536 "
Amount of hay	7,119 "
Amount of straw eaten	5,355 "

Lot 'C'—(Two-year-olds)—Tied.

Number of steers in lot	9
First weight, gross	9,216 lbs.
First weight, average	1,024 "
Finished weight, gross	11,709 "
Finished weight, average	1,301 "
Total gain in 129 days	2,493 "
Average gain per steer	277 "
Daily gain for lot, 9 steers	19·35 "
Daily gain per steer	2·15 "
Gross cost of feed	$ 128 40
Cost of 100 pounds gain	5 16
Cost of steers, 9,216 lbs. at $4 per 100 lbs.	368 64
Total cost to produce beef, $368.64 + $128.40	479 04
Sold, 11,709 lbs. at $5 per 100 lbs., less 5 per cent.	556 20
Profit on lot	59 16
Net profit per steer	6 57
Average buying price per steer	40 96
Average selling price per steer	61 80
Average increase in value	20 84
Average cost of feed per steer	14 25
Amount of meal eaten by lot of 9 steers	4,613 lbs.
Amount of ensilage and roots	47,943 "
Amount of hay	7,219 "
Amount of straw	4,536 "

Lot 'D'—(Two-year-olds)—Loose.

Number of steers in lot	8
First weight, gross	7,736 lbs.
First weight, average	967 "
Finished weight, gross	10,424 "
Finished weight, average	1,303 "
Total gain in 129 days	2,516 "
Average gain per steer	327 "
Daily gain for lot, 8 steer	21·24
Daily gain per steer	2·53
Gross cost of feed	$ 122 89
Cost of 100 pounds gain	4 80
Cost of steers, 7,736 lbs. at $3.90 per 100 lbs.	294 00
Total cost to produce beef, $294 + $122.89	416 89
Sold, 10,424 lbs. at $4.85 per 100 lbs., less 5 per cent.	480 29
Profit on lot	63 40
Net profit per steer	7 92
Average buying price per steer	36 75
Average selling price per steer	60 03
Average increase in value	23 28
Average cost of feed per steer	15 36
Amount of meal eaten by lot of 8 steers	4,102 lbs.
Amount of ensilage and roots	43,110 "
Amount of hay	6,328 "
Amount of straw eaten	3,032 "

INFLUENCE OF AGE ON COST OF BEEF.

Cost of producing Beef with three-year-olds, two-year-olds, yearlings, six months' calves and new-born calves.

The experiments to gain some data as to the influence of age upon the cost of producing a pound of beef have been continued and are now concluded.

Lots of animals of as nearly uniform type and breeding as possible were selected and fed such rations as were found to suit them best. The roughage ration in each case consisted of roots, ensilage and hay, the concentrates fed to three-year-olds, two-year-olds, and yearlings was gluten meal. The calves were fed a meal ration made up of oats, pease, barley, oil meal and gluten mixed in different proportions at different periods.

Full statements of the particulars in connection with each lot will be found below. A few of the more important particulars are grouped for comparison, as follows:—

Ages.	Daily Gain.	Gain in 129 days.	Cost 100 lbs. Gain.
	Lbs.	Lbs.	$ cts.
Three-year-olds	2·28	294	5 22
Two-year-olds	2·53	327	4 80
Yearlings	1·9	242	5 62
Six month calves	1·75	267	4 48
Skim-milk calves, new born	1·68	360	2 77

INFLUENCE OF AGE OF STEERS ON COST OF PRODUCTION OF BEEF.

Lot 'E'—(Three-year-olds)—Loose.

Number of steers in lot	8
First weight, gross	9,888 lbs
First weight, average	1,236 "
Finished weight, gross	12,240 "
Finished weight, average	1,530 "
Total gain in 129 days	2,352 "
Average gain per steer	294 "
Daily gain for lot, 8 steers	18·24 "
Daily gain per steer	2·28 "
Gross cost of feed	$ 122 89
Cost of 100 pounds gain	5 22
Cost of steers, 9,888 lbs. at $4 per 100 lbs.	395 52
Total cost to produce beef, $395.52 + $122.89	518 41
Sold, 12,240 lbs. at $5 per 100 lbs., less 5 per cent.	581 40
Profit on lot	62 99
Net profit per steer	7 87
Average buying price per steer	49 44
Average selling price per steer	72 76
Average increase in value	23 23
Average cost of feed per steer	15 36
Amount of meal eaten by lot of 8 steers	4,127 "
Amount of ensilage and roots	49,728 "
Amount of hay	6,328 "
Amount of straw eaten	4,872 "

Lot 'F'—(Two-year-olds)—Loose.

Number of steers in lot	8
First weight, gross	7,736 lbs.
First weight, average	967 "
Finished weight, gross	10,424 "
Finished weight, average	1,303 "
Total gain in 129 days	2,516 "
Average gain per steer	327 "
Daily gain for lot, 8 steers	21·24 "
Daily gain per steer	2·53 "
Gross cost of feed	$ 122 89
Cost of 100 pounds gain	4 30
Cost of steers, 7,736 lbs. at $3.90 per 100 lbs.	294 00
Total cost to produce beef, $294 + $122.89	416 89
Sold, 10,424 lbs. at $4.85 per 100 lbs., less 5 per cent.	480 29
Profit on lot	63 40
Net profit per steer	7 92
Average buying price per steer	36 75
Average selling price per steer	60 03
Average increase in value	23 28
Average cost of feed per steer	15 36
Amount of meal eaten by lot of 8 steers	4,102 lbs.
Amount of ensilage and roots	43,110 "
Amount of hay	6,328 "
Amount of straw eaten	3,032 "

Lot 'G'—(Yearlings)—Loose.

Number of steers in lot	8	
First weight, gross	6,464	lbs.
First weight, average	808	"
Finished weight, gross	8,400	"
Finished weight, average	1,050	"
Total gain in 129 days	1,936	"
Average gain per steer	242	"
Daily gain for lot, 8 steers	1·52	
Daily gain per steer	1·79	
Gross cost of feed	$ 108 80	
Cost of 100 pounds gain	5 62	
Cost of steers, 6,464 lbs. at $3.50 per 100 lbs.	226 24	
Total cost to produce beef, $226.24 + $108.80	335 04	
Sold, 8,400 lbs. at $4.75 per 100 lbs., less 5 per cent.	379 05	
Profit on lot	44 01	
Net profit per steer	5 50	
Average buying price per steer	28 28	
Average selling price per steer	47 43	
Average increase in value	19 15	
Average cost of feed per steer	13 60	
Amount of meal eaten by lot of 8 steers	4,102	lbs.
Amount of ensilage and roots	38,360	"
Amount of hay	6,104	"
Amount of straw eaten	4,032	"

Lot 'H'—(Calves over 6 months)—Loose.

Number of steers in lot	5	
First weight, gross	1,930	lbs.
First weight, average	386	"
Finished weight, gross	3,265	"
Finished weight, average	653	"
Total gain in 152 days	1,335	"
Average gain per steer	267	"
Daily gain for lot, 5 steers	8·75	"
Daily gain per steer	1·75	"
Gross cost of feed for 152 days	$ 59 83	
Cost of 100 pounds gain	4 48	
Average cost of feed per steer for 152 days	11 96	
Amount of meal eaten by lot of 5 steers	2,674	lbs.
Amount of ensilage and roots	20,377	"
Amount of hay	1,820	"
Amount of straw eaten	980	"
Amount of sugar beet pulp and molasses (dried)	343	"

Lot 'I'—(Calves under 6 months)—Loose.

Number of steers in lot	6	
First weight, gross	740	lbs.
First weight, average	123	"
Finished weight, gross	2,900	"
Finished weight, average	483	"
Total gain in 214 days	2,160	"
Average gain per steer	360	"
Daily gain for lot, 6 steers	10·08	"
Daily gain per steer	1·68	"

Gross cost of feed	$ 59 83
Cost of 100 pounds gain	2 77
Average cost of feed per steer	9 97
Amount of meal eaten by lot of 6 steers	2,361 lbs.
Amount of ensilage and roots	9,240 "
Amount of hay	1,512 "
Green feed	9,408 "

BABY BEEF.

The fourth and fifth lots of calves of the series of baby beef experiments are now under way. It is proposed to end this experiment when the present lots are slaughtered. Since a full discussion of the matter will be necessary when the final lots are reported upon, no comment is made upon the lots now being fed and herewith reported upon up to date.

Lot 'J'—(Yearlings)—Fattening Lot.

Number of steers in lot	5
First weight, gross	1,930 lbs.
First weight, average	386 "
Last weight, gross	4,950 "
Last weight, average	990 "
Total gain in 365 days	3,020 "
Average gain per steer	604 "
Daily gain for lot, 5 steers	8·25 "
Daily gain per steer	1·65 "
Gross cost of feed	$108 46
Cost of 100 lbs. gain	3 59
Average cost of feed per steer	21 69
Amount of meal eaten by lot of 5 steers	4,699 "
Amount of ensilage and roots	40,862 "
Amount of hay	3,370 "
Amount of straw	1,540 "
Amount sugar beet pulp (dried)	378 "

Meal consumed consisted of : Oats, 2,091 lbs.; oil meal, 937 lbs.; bran, 1,027 lbs.; and gluten, 644 lbs.

Lot 'K'—(Yearlings)—Limited Ration Lot.

Number of steers in lot	5
First weight, gross	1,760 lbs.
First weight, average	325 "
Finished weight, gross	3,690 "
Last weight, average	738 "
Total gain in 365 days	1,930 "
Average gain per steer	386 "
Daily gain for lot, 5 steers	5·30 "
Daily gain per steer	1·06 "
Gross cost of feed	$63 68
Cost of 100 lbs. gain	3 30
Average cost of feed per steer	12 73
Amount of meal eaten by lot of 5 steers	898 lbs.
Amount of ensilage and roots	40,370 "
Amount of hay	3,277 "
Amount of straw eaten	1,190 "
Amount of potatoes	816 "
On pasture 6 months	36 mos.

Meal consumed consisted of : Oats, 387 lbs.; gluten, 255½ lbs.; oil meal, 101½ lbs.; bran, 154.

Lot 'L'—(Steer Calves)—Fattening Ration.

Number of steers in lot	6	
First weight, gross	740	lbs.
First weight, average	123	"
Last weight, gross	2,900	"
Last weight, average	483	"
Total gain in 214 days	2,160	"
Average gain per steer	360	"
Daily gain for lot, 6 steers	10·08	"
Daily gain per steer	1·68	"
Gross cost of feed	$ 59 83	
Cost of 100 lbs. gain	2 77	
Average cost of feed per steer	9 97	
Amount of meal eaten by lot of 6 steers	2,025	lbs.
Amount of roots and ensilage	9,240	"
Amount of hay	1,512	"
Green feed	9,408	"

Meal consumed consisted of : Oats, 780 lbs.; oil meal, 171 lbs.; barley meal, 336; and bran, 738.

Lot 'M'—(Steer Calves)—Limited Ration Lot.

Number of steers in lot	6	
First weight, gross	490	lbs.
First weight, average	81	"
Last weight, gross	2,530	"
Last weight, average	421	"
Total gain in 214 days	2,040	"
Average gain per steer	340	"
Daily gain for lot, 6 steers	9·53	"
Daily gain per steer	1·58	"
Gross cost of feed	$ 57 90	
Cost of 100 lbs. gain	2 83	
Average cost of feed per steer	9 65	
Amount of meal eaten by lot of 6 steers	1,878	lbs.
Amount of ensilage and roots	10,842	"
Amount of hay	1,599	"
Amount of green feed	7,266	"

Meal consumed consisted of : Oats, 780 lbs.; oil meal, 96; barley meal, 273; bran, 729.

SUGAR BEET PULP.

'Improved Molasses Cattle Feed,' the name under which the Dresden Beet Sugar Manufacturing Company placed the combined dried sugar beet pulp and residual molasses from their factory upon the market, is a feed that has received a fairly thorough and very careful test during the past winter months.

Before entering into a full report of the experiments conducted it may be stated in a general way that this preparation is one that, according to shipments received here lacks in uniformity of composition. The molasses would appear to have been mixed with the pulp in an irregular way so that when feeding it to animals there is not likely to be much uniformity in the composition of succeeding portions fed. This

peculiarity is, of course, decidedly objectionable, especially where it is fed in any considerable quantities per diem.

It is objectionable in this, that the effect it will have upon the digestive organs of the animal fed cannot be counted upon. The molasses part of the preparation is somewhat laxative in character and when it is in excess, as occurs occasionally, the animal's digestive organs are more or less deranged for a longer or shorter period. The average feeder would be quite unlikely to note the excess of molasses by looking at the feed.

Where fed in small quantities, say 1 to 3 lbs. per diem, to either calves or mature cattle, however, this peculiarity is of no consequence.

VALUE OF PRODUCT.

We have found the preparation of particular value for feeding to young steers or beef animals. Its value lies in its extreme palatability. It serves to whet the appetite of the otherwise sated fatting calves and induces them to eat not only the portion of Improved Molasses Cattle Feed fed them in excess of the previous ration but quite frequently seems to cause them to eat more of other and possibly more fattening feeds. It is in this direction, that is as an appetiser, that the future of the feed lies, if our experiments count for anything.

EXPERIMENTS WITH DAIRY COWS.

It was fed to dairy cows both in excess of the normal meal ration usually fed and as replacing part of the meal ration. It proved of quite low value in this connection, being apparently equivalent to about half an equal weight of bran as an incentive to greater or even equal milk production.

WITH TWO-YEAR-OLD AND THREE-YEAR-OLD STEERS.

It was used also on some two-year-old and on some three-year-old steers. It was used as an addition to the meal ration and latterly as a substitute for part of the meal ration. In neither case did it prove to be equal to more than about half its weight of bran or other concentrate ration. It was of value, however, in improving the appearance of the cattle, giving them a sleek look scarcely attainable otherwise.

AS ROUGHNESS.

An experiment to determine its value as a substitute for roots or ensilage was conducted and the results are given:—

Nine three-year-old steers were chosen and divided into three groups of three each.

Lot 1. Received no improved molasses cattle feed.

Lot 2. Received 8 lbs. improved molasses cattle feed per diem and half amount other roughness fed Lot 1.

Lot 3. Received 12 lbs. improved molasses cattle feed and 4 lbs. straw per diem.

All lots received equal amounts of long hay and meal.

Particulars are as follows:—

Lot 1. Receiving no improved molasses cattle feed—

	Lbs.
First weight, December 28, 1903.....Total	3,880
Average	1,293
Last weight, March 22, 1904.....Total	4,380
Average	1,460
Gain in 83 days.....Total	500
Average	167
Daily rate of gain per steer.....	2

Three steers consumed of roughness—

	Lbs.	Per ton.	Value.
Ensilage	8,106	$2 00	$8 11
Roots	1,621	2 00	1 62
Straw	996	4 00	1 99
Total cost of roughness used			$11 72

Cost of roughness used in producing 1 lb. increase in live weight, 2·35 cents.

Lot 2. Receiving 8 lbs. improved molasses cattle feed and one-half other roughness—

	Lbs.
First weight, December 28, 1903 ....Total	4,115
Average	1,372
Last weight, March 22, 1904 ....Total	4,730
Average	1,577
Gain in 83 days ....Total	615
Average	205
Daily rate of gain per steer	2·47

Three steers consumed of roughness:—

	Lbs.	Per ton.	Value.
Ensilage	4,953	$ 2 00	$ 4 95
Roots	810	2 00	0 81
Straw	498	4 00	1 00
Improved molasses cattle feed	1,992	15 00	14 94
Total cost of roughness used			$20 80

Cost of roughness used in producing 1 lb. increase in live weight, 3·38 cents.

Lot 3 Receiving 12 lbs. improved molasses cattle feed and 4 lbs. straw per diem—

	Lbs.
First weight, December 28, 1903 ....Total	3,990
Average	1,330
Last weight, March 22, 1904 ....Total	4,455
Average	1,485
Gain in 83 days ....Total	465
Average	155
Daily rate of gain per steer	1·87

	Lbs.	Per ton.	Value.
Improved molasses cattle feed	2,928	$15 00	$21 97
Straw	996	4 00	1 99
Total cost of roughness used			$23 96

Cost of roughness used in producing 1 lb. increase in live weight, 5·15 cents.

From the above data it is evident that where 8 lbs. Improved Molasses Cattle Feed took the place of half the straw, roots, and ensilage, it may be said to have been worth $5.86 for 1,992 lbs., or about $5.90 per ton.

In the case of lot 3, where 12 lbs. was fed per diem, a slightly higher value is indicated, namely, $6.30 per ton.

UVECO FOR BEEF PRODUCTION.

Uveco, a prepared food (see page 74), was fed in small quantities to a number of steers and all seemed to be very fond of it. The supply was limited, however, and so it was possible to feed only two steers with this food as an exclusive grain ration.

Two small steers put upon this feed as an exclusive meal ration on April 14, weighed together 1,685 lbs. on that date. They thrived very well and on May 30, 45 days after starting, weighed 1,810 lbs., a gain of 125 lbs. for the pair, or 62½ lbs. per steer, which was at the rate of about 1·4 lb per diem.

The meat from these steers was of very excellent quality, due in some measure no doubt to the good quality of the food fed.

So far as gains are concerned, it will of course be noted that much larger daily gains were quite possible.

PORK PRODUCTION.

PIG FEEDING EXPERIMENTS.

A large number of pigs have been fed during the year. Most of them were pastured for a shorter or longer time on hog lands. (See plan and report, page 80).

These experiments in pasturing are incomplete and will be reported upon at a later date.

WINTERING SOWS OUTSIDE VS. INSIDE.

Where much pasturing of pigs is carried on the wintering of the sows and the fall litters is always a problem of considerable difficulty, since the full utilization of pastures requires pigs ready to turn out at an early date in the spring.

During the past winter a number of the brood sows were housed in the small single board cabins used on the pastures in summer. They did well and were healthy, but cost about 25 per cent more to maintain in good condition than did their mates housed in the regular brood sow run or house.

WINTERING YOUNG PIGS OUTSIDE VS. INSIDE.

A study was also made of the comparative economy of feeding fall pigs outside and inside.

Below is a statement of the results secured. There were two lots inside and two lots outside. The lots were from two different litters, some from each being inside and the rest outside.

YOUNG PIGS WINTERED INSIDE vs. OUTSIDE.

—	Lot 1.	Lot 2.	Lot 3.	Lot 4.	Lots 1 & 3.	Lots 2 & 4.
Location	Inside.	Outside.	Inside.	Outside.	Inside.	Outside.
Number of pigs in lot	5	4	4	7	9	11
Number of days on feed....Days	60	60	60	60	60	60
Description of ration fed....Lbs.	Shorts 100 Gluten 100	Shorts 100 Gluten 100	Oil meal 100 Shorts 400	Shorts 400 Oil meal 100	Mixed meals.	Mixed meal as inside.
Pounds of mixture required for 100 lbs. gain	417	552½	280	502	365⅓	526
Amount fed in period....Lbs.	993	1,071	400	1,265	1,393	2,336
Value....$	10.67	11.51	4.00	12.65	14.67	24.16
Gain made by lot....Lbs.	238	192	143	252	381	444
Average gain per pig.... "	48	48	35⅞	36	42⅓	40⅓
Average rate of gain per diem. "	.82	.80	.6	.6	.70	.68
Cost of 100 lbs. increase in live weight....$	4.43	6.00	2.80	5.02	3.85	5.42
Health and appearance	Good.	Good.	Good.	Good.	Good.	Good.
Weight of lot to start....Lbs.	496	400	181	331	677	731
Average weight to start.... "	99	100	45¼	47	75	66½
Weight of lot at finish.... "	734	592	324	583	1,058	1,175
Average weight at finish.... "	147	148	81	83	117½	107

RAISING YOUNG PIGS.

A problem that confronts the farmer who wishes to go heavily into bacon production is the raising of young pigs to the age of 3 or 4 months without the help of skim-milk or whey. This difficulty is more particularly noticed in winter or autumn. To gain some information as to the probably best meal mixtures for the purpose, two experiments were tried in January, February and March, 1904. One was conducted outside with pigs housed in small cabins, as mentioned above, and the other inside the regular piggery.

In determining the value of a meal mixture the items to be considered are the rate of gain and the cost of 100 pounds increase in weight.

OUTSIDE FEEDING.

An examination of the reports of the experiments carried on outside, submitted below, shows that a mixture of shorts 4 parts and oil meal 1 part produced pork for $5.02 per 100 pounds at the rate of 6-10ths of a pound per day. Shorts and gluten meal equal parts produced pork at a more rapid rate, viz.: 8-10th pounds per day, but at a slightly higher cost, viz., $6 per 100 pounds. The difference may have been due to the difference in the age of the pigs. A mixture of shorts and oil meal equal parts gave very poor results since it cost $7.93 to produce 100 pounds live weight at the rate of 47-100th pounds per pig per day.

INSIDE FEEDING.

When similar feeds were fed inside much better results were noted. Both the rate of gain per day being slightly increased and the cost of production lowered. The mixture of shorts 4 parts and oil meal 1 part was again to the fore, as gains were made at a cost of $2.80 per 100 pounds gain and at the rate of 6-10th pounds per pig per day.

RATIONS FOR YOUNG PIGS OUTSIDE.

——	Lot 3.	Lot 4.	Lot 6.	Lot 7.	Lot 8.	Lot 9.
Number of pigs in lot	4	4	6	7	4	4
Location	Outside.	Outside.	Outside.	Outside.	Outside.	Outside.
No. of days on feed	60	60	60	60	60	60
Description of ration fed....Lbs.	Shorts 100 Gluten 100	Shorts 100 Oil meal 100	Oats 200 Shorts 100	Shorts 400 Oil meal 100	Oats 100 Shorts 200	Shorts 400 Oil meal 100 Gluten 100 Skim-milk 4½ lbs. perd.
Pounds of meal mixture required for 100 lbs. gain	552½	721	600	502	600	Meal 281½ Milk 766
Amount fed in period....Lbs.	1,071	808	1,080	1,265	1,176	Milk 1,134 Meal 417
Value....$	11.51	8.88	10.80	12.65	11.76	5.49
Gain made by lot....Lbs.	192	112	180	252	196	148
Average gain per pig.... "	48	28	30	36	28	37
Daily rate of gain.... "	.8	.47	.5	.6	.47	.62
Cost of 100 lbs. increase in live weight....$	6.00	7.93	6.00	5.02	5.70	3.82
Health and appearance....	Good.	Good.	Good.	Good.	Fair.	Excellent.
Weight of lot to start....Lbs.	400	155	384	331	556	256
Average weight to start.... "	100	38·7	64	47	81	64
Weight of lot at finish.... "	592	267	564	583	762	403
Average weight at finish.... "	148	66·7	94	83	109	101

RATIONS FOR YOUNG PIGS INSIDE.

—	Lot 1.	Lot 2.	Lot 3.	Lot 4.	Lot 5.
Number of pigs in lot	5	4	5	4	5
Location	Inside.	Inside.	Inside.	Inside.	Inside.
Number of days on feed	40	40	60	60	60
Description of ration fed	Oil meal 200, Shorts 200, Gluten 200, Oats 200, Skim-milk 4½ lbs. a day	Shorts. Skim-milk.	Shorts 100 Gluten 100	Shorts 400 Oil meal 100	Oats 100 Oil meal 100
Pounds of mixture required for 100 pounds gain ..... Lbs.	190 meal, 564 skim-milk.	152 meal, 564 skim milk.	417	280	322
Amount fed in period ..... "	252 meal, 750 milk.	204 meal, 756 milk.	993	400	699
Value ..... $	3.94	2.96	10 67	4.00	8.04
Gain made by lot ..... Lbs.	133	134	238	143	217
Average gain per pig ..... "	26½	33½	48	35¾	44¼
Average rate of gain per day ..... "	.66	.84	.82	.6	.74
Cost of 100 lbs. increase in live weight ..... $	2.94	2.21	4.48	2.80	3.70
Health and appearance	Very good.	Excellent.	Good.	Good.	Good.
Weight of lot to start ..... Lbs.	183	122	496	181	379
Average weight to start ..... "	36½	30½	99	45¼	76
Weight of lot at finish ..... "	316	256	734	324	595
Average weight at finish ..... "	63	64	147	81	119

STOCK FOODS FOR PORK PRODUCTION.

In August, 32 pigs, ranging in weight from 43 to 80 pounds were divided into 8 groups of 4 pigs each, and for the next 90 days fed experimentally. In each case the individuals in a group were nearly uniform in size. The groups, however, showed considerable difference in their total weights, the heaviest group weighing 300 pounds or 75 pounds per pig, while the lightest group weighed 180 pounds or 45 pounds per pig. It was not possible to secure a more uniform lot at the time and it was considered better to have considerable difference in the total weights of the lots rather than to have some large and some small pigs in each lot.

The experiments lasted 90 days. During that time the pigs were confined in pens with small floored yards attached. Lots 7 and 8, however, were outside, lot 7 having a small unfloored yard and a cabin wherein to sleep, while lot 8 had a clover pasture of about ½ acre area and a cabin wherein to sleep.

The results speak for themselves, but it will be noticed that all supplementary foods fed other than skim-milk and pasture, had the effect of raising the cost of production. Skim-milk on the contrary lowered the cost very materially, and pasture had a similar effect in a lesser degree. The meal used was a mixture of half shorts and half mixed grains, oats, pease and barley.

In estimating the cost of production the meal ration is valued at $1 per 100 pounds, the skim-milk at 15 cents per 100 pounds, and the supplementary foods or stock foods at the cost of the same on the Ottawa markets, viz., Anglo-Saxon Stock Food, 10 cents per pound, International Stock Food, 15 cents per pound, Herbageum, 12½ cents per pound and Sugar and Flax 2½ cents per pound. Pasture is not valued, but its value may be deduced from the data given.

Lot	1	2	3	4	5	6	7	8
Description of Ration	Meal, Inside.	Meal, Anglo Saxon Stock Food.	Meal, Internation'l Stock Food.	Meal, Sour skim-milk.	Meal, Herbageum.	Meal, Sugar and Flax.	Meal, Outside.	Meal, Pasture Clover and Rape.
No. of Pigs	4	4	4	4	4	4	4	4
No. of days on feed	90	90	90	90	90	90	90	90
Total weight to start	300 lbs.	206 lbs.	208 lbs.	180 lbs.	220 lbs.	240 lbs.	204 lbs.	250 lbs.
Average weight to start	75 "	51½ "	52 "	45 "	55 "	60 "	51 "	62½ "
Total weight at end of experiment	725 "	565 "	541 "	612 "	673 "	711 "	657 "	653 "
Average weight at end of experiment	181¼ "	141¼ "	135¼ "	153 "	168 "	178 "	164 "	163 "
Amount meal eaten	1,860 "	1,551 "	1,456 "	1,275 "	1,781 "	1,880 "	1,942 "	1,741 "
Amount other food	.....	80 "	42 "	1,335 "	45 "	322 "	.....	Pasture.
Total gain of lot in 90 days	425 lbs.	359 "	333 "	432 "	453 "	471 "	453 lbs.	413 lbs.
Amount meal required for 100 lbs. gain	438 "	432 "	437 "	295 "	393 "	399 "	431 "	421 "
Amount other food for 100 lbs. gain	.....	22 "	12 "	309 "	10 "	68 "	.....	Pasture.
Cost of 100 lbs. gain	$4.38	$6.52	$6.17	$3.42	$5.15	$5.69	$4.31	$4.21
Daily rate of gain per pig	1·171 lbs.	1·00 lbs.	·925 lbs.	1·20 lbs.	1·25 lbs.	1·31 lbs.	1·25 lbs.	1·15 lbs.
Total gain per pig in 90 days	106¼ "	89¾ "	83¼ "	108 "	113¼ "	117¾ "	113¼ "	103¼ "

The Anglo-Saxon Stock Food, the International Stock Food and Herbageum were all fed according to manufacturers' directions both as to quantity to feed and method of feeding.

UVECO VS. SHORTS AND OATS FOR PORK PRODUCTION.

In the winter of 1904 a shipment of a prepared food called 'Uveco' was received from 'Uveco Cereals, Ltd., Usk Vale Mills, Newport, Mon., England.

This food looked as though it might have been prepared from Indian corn by cooking or steaming and then passing between heated rollers while still wet. It was fed to a lot of 3 pigs for 7 weeks, with results given below. At the same time a similar lot of pigs was fed on an equal amount of a mixture of equal parts shorts and crushed oats.

	Uveco.	Shorts and Oats.
Weight of pigs to start May 5	239	239
Average weight	79⅔	79⅔
Weight of pigs, July 11	405	363
Average weight of July 11	135	121
Increase in weight in lot	166	124
Gain per pig in 49 days	55	41
Daily rate of gain	1·12	·84
Amount food consumed	533	533
Value of food required for 100 lbs. gain		$ 4 08

An examination of the table shows that while 430 pounds of shorts and oats was required to produce 100 pounds increase in live weight, only 321 pounds of Uveco was required to secure a similar result. If 430 pounds of shorts and oats be worth $4.08 it is evident that 321 pounds of Uveco may be claimed to be worth the same amount, *i.e.*, Uveco may be said to be worth $1.27 per 100 pounds.

This is of course a single trial and no definite conclusion should be based upon the results.

The food was evidently very palatable as the pigs ate it with avidity, and when it was fed in small quantities to young pigs they always seemed to want more of it than of any of the regular meals fed.

The keenness of appetite for the food wore off as the experiment advanced, however, and it seemed evident that some other food would have to be fed along with the Uveco if a long feeding period were intended.

LARGE BLACKS.

For a number of years Large Blacks have been bred on the farm to gain some information as to their value as a class of swine for bacon production. They have been tested in various ways, and the results may be summarized as follows:—

1. As prolific and healthy breeding stock they cannot be surpassed by any of the breeds now commonly bred in Canada.

2. As pigs for crossing they are exceedingly impressive whether male or female, and leave their mark stamped very distinctly no matter what the other cross may be. The cross-breds have also been uniformly healthy and quick feeders, the cross with the Tamworth being particularly remarkable in this respect.

3. As pure-bred pigs they have been found to be rapid and easy fatteners, exceedingly good grass or pasture pigs, and have stood all kinds of weather without any apparent evil effects.

4. As pigs for bacon production, however, they have proven to be a complete failure. The carcases have been invariably scored as falling far short of the ideal in (*a.*) quality of meat, (*b.*) uniformity of fat layer on the back, (*c.*) length of side, (*d.*) too little thickness of belly meat and too great a proportion of belly meat to the rest of the carcase, and (*e.*) a marked tendency to lay on fat thickly rather than develop a large amount of lean meat.

A pair was exhibited at the Guelph Fat Stock Show in December, 1903, and experts from the largest packing houses were at one in condemning them for the reasons I have given above.

COMPARATIVE Statement of Crops on '200 Acre Farm,' from 1899 to 1904, inclusive. (200 Acre Farm includes 7 Acres of Roads.)

Year.	GRAIN.		HAY.		ROOTS AND CORN.		PASTURE.		SOILING CROP.			PIG PASTURE.		Remarks.
	Area in Acres.	Yield in Pounds.	Area in Acres.	Yield in Tons.	Area in Acres.	Yield in Tons.	Area in Acres.	Number of Cattle.	Area in Acres.	Disposition of Crops.		Area in Acres.	Crops Grown for Pasture.	
1899	73	118,466	39	93	40	326½	40	36	1	Fed to dairy cows		...	... ...	Generally considered a good year for all crops.
1900	80	126,621	53	138	40	743	20 and aftermath	49	....	....	....	....	....	Season very favourable for most crops.
1901	79	114,472	58	210	40	702	16 and aftermath	52	....	....	....	....	....	Season very favourable for most crops.
1902	74	141,914	60	216	39	665	20 and aftermath	62	....	....	....	5	Clover, rape and aftermath.	Season favourable for hay, bad for corn.
1903	69	126,619	62	154	34	473	16 and aftermath	96	5	Dairy cows, bulls and calves.		6	Clover and rape.	Season very unfavourable for most crops, particularly adverse to corn and roots. No second crop hay.
1904	67	112,009	60	192	46¼	674	13·75	98	3	Dairy cows, bulls and calves.		3	Clover and rape.	Season unfavourable for grain and corn, good for hay and roots.

The variety of crops grown and the varying areas under each crop each year make it quite difficult to make a comparison of the returns of the different years, so to simplify matters I would suggest that a fixed valuation be put upon the products, and the returns of each year valued accordingly.

Fixing prices as follows : Grain, $1 per 100 lbs.; roots and ensilage, $2 per ton; hay, $7 per ton; pasturing cattle, $8 per season: and area under pigs, $15 per acre; the returns from the '200 Acre Farm' for the years mentioned may be said to have been worth $2,776.66 in 1899; $4,110.21 in 1900; $4,434.72 in 1901; $4,787.14 in 1902; $4,148.19 in 1903; $4,741.09 in 1904.

UTILIZATION OF FEED.

An examination into the supply of feed produced on the '200 Acre Farm,' the experimental plots of roots and corn, and the meal or grain purchased for use in the barns, together with a detailed statement of the disposal thereof, and a statement of the kinds of grain and meal consumed from July 1, 1903, to June 30, 1904, follows :—

SUMMARY of Feed of all kinds used for Stock on 200 Acre Farm from July 1, 1903, to June 30, 1904.

——	Straw.	Grain or Meal.	Roots and Ensilage.	Hay.
	Lbs.	Lbs.	Lbs.	Lbs.
Grown on 200 Acre Farm, (crop of 1903)	120,000	106,621	900,000	304,000
Received from Experimental Department	10,000	.....	217,745	
Received from Distribution Division (refuse grain)	.....	39,318		
Purchased	110,000	249,863	.....	8,000
Total	240,000	395,802	1,117,745	312,000

DISPOSITION of Feed harvested on, and bought for use of Live Stock on 200 'Acre Farm.'

Class Fed.	Hay.	Grain and Meal.	Corn and Roots.	Feeding Straw.	Bedding Straw.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
19 horses	130,000	115,512	3,000	.....	28,000
81 steers	37,393	36,107	340,400	24,563	50,600
38 milch cows, all breeds	53,480	63,144	344,128	15,460	30,650
40 young stock and bulls, all breeds	40,500	15,680	200,040	20,478	30,480
75 sheep	20,500	9,041	5,000	.....	5,000
400 swine	.....	110,500	25,000	.....	20,000
Poultry division	.....	21,615	2,700	.....	13,950
Loss by experimental curing	4,000	.....	5,500	.....	.....
Total accounted for	285,873	371,599	925,768	60,501	178,680
Amount harvested and received	312,000	395,802	1,117,745	.....	.....
Shrinkage or loss	26,127	24,203	191,977	.....	.....
Percentage shrinkage or loss	8·38%	6·12%	17·17%	.....	.....

The meal consumed consisted of :—

	Lbs.
Oats	168,777
Barley	3,761
Bran	81,549
Shorts	76,101
Gluten meal	27,000
Mixed grain (oats, pease, barley)	23,399
Corn meal	956
Oil meal	5,400
Uveco	2,717
Other special feeds	6,142
Total	395,802

BALANCE SHEET OR FINANCIAL STATEMENT OF LIVE STOCK FEEDING OPERATIONS ON 200 ACRE FARM, JULY 1, 1903, TO JUNE 30, 1904

In compiling the following table, the figures in the columns headed 'Value' in both 1903 and 1904 represent either the cost price of the animals included, where recently bought, or the fair merchantable price of the same at the date of valuation.

Under the heading 'Returns' are included values of products and services during the year.

LIVE STOCK INVENTORIES.

—	July 1, 1903.		June 30, 1904.				
	Number on hand.	Value.	Number handled during year.	Number on hand.	Value.	Returns of all descriptions.	Gross returns made up of increase in value, value of products and animals sold.
		$ cts.			$ cts.	$ cts.	$ cts.
Horses	19			19		2,630 00	2,630 00
Shorthorns—							
Pure-breds (15) and grades (3)	20	3,410 00	25	18	3,495 00	726 29	811 29
Ayrshires—							
Pure-breds (18) and grades (10)	30	2,410 00	39	28	2,560 00	1,240 50	1,390 50
Guernseys—							
Pure-breds (13) and grades (10)	23	1,956 00	28	23	2,040 00	1,160 72	1,244 72
Canadians—							
Pure-breds (8) and grades (2)	9	895 00	14	10	1,075 00	542 40	622 40
Steers	67	2,307 00	67	22	440 00	3,005 50	1,138 50
Sheep	64	935 00	96	66	1,020 00	160 00	245 00
Swine	255	2,040 00	405	260	2,090 00	1,860 55	1,910 55
Total		13,953 00		446	12,720 00	11,325 96	9,992 96

SUMMARY.

RETURNS.

Gross returns from animals of all classes, including value of products, value of services and increase in value of young stock		9,992 96
Manure, 1,100 tons		1,100 00
		$11,092 96

EXPENDITURE.

Value of Food Consumed.

Meal		$3,560 89
Hay		1,078 00
Roots and ensilage		1,109 54
Whole milk, 17,640 lbs		176 40
Skim-milk, 180,000 lbs		270 00
		6,194 83
Straw, 112 tons at $4 per ton		448 00
Cost of labour in connection with care of horses, cattle, sheep and swine:—		
Herdsman	$660 00	
Two men at $480	960 00	
Three men at $432	1,296 00	
Extra help, teaming, &c	461 40	
	$3,377 40	3,377 40
		$10,020 23
Balance		1,072 73

It will be noted that the clear profit after all items have been paid is rather small when the number of animals is considered. It must be remembered, however, that all feeds are charged at market prices and no allowance made for shrink or loss in curing; further, that straw for bedding, &c., is charged at $4 per ton. The wage item in connection with the care and feeding is likewise open to criticism, but may be explained as follows. In the first place, experimental feeding demands more time and a higher class service than is generally used by farmers; in addition, proximity to Ottawa raises the wage rate, and lastly, the buildings and facilities for feeding and caring for the stock are not nearly so good as they should be.

ROTATION EXPERIMENT.

For five years, from 1899 to 1903, inclusive, the '200-acre farm' has been cropped under a rotation of five years' duration as follows: Clover hay; Timothy or mixed hay or pasture; grain, 10 pounds Red Clover for fertilizing purposes; corn or roots; grain, 8 pounds Red Clover, 10 pounds Timothy seed for meadow.

The results have been very interesting, since the aggregate annual crop returns from the farm seemed to have been materially increased. The fact that a rotation

of the character described above seemed to help increase the crop returns from a given area and at the same time increase the fertility of that area, has led to the putting under way of a number of rotations of different lengths, with different crops in different orders and with different purposes in view.

It is not possible this year to explain or outline the whole scheme, but brief descriptions of the rotations, the areas devoted to each and the results obtained from each field, are submitted herewith.

The rotations are as follows:—

Rotation A.—Five years, Clover hay, Timothy hay, grain, corn, grain.

Rotation B.—Five years, Clover hay, grain, Clover hay, corn, grain.

Rotation E.—Three years, pasture, corn, grain.

Rotation Z.—Three years, Clover hay, corn, grain.

Rotation S.—Four years, shallow cultivation, Clover hay, Timothy hay, roots, grain.

Rotation D.—Four years, deep cultivation, Clover hay, Timothy hay, roots, grain.

Rotation H.—Three years, hog pasture, roots, grain or soiling crop.

Rotation T.—Four years, sheep pasture, roots and soiling crop, grain, Clover hay.

Rotation M.—Six years, grain, grain, Clover hay, Timothy hay for three years.

Rotation N.—Six years, grain, grain, Timothy hay for four years.

Rotation O.—Three years, grain, Timothy hay, Timothy hay.

Rotation P.—Three years, grain, Clover hay, Timothy hay.

In the descriptions of the rotations and fields that follow, an effort is made to give as concisely as possible the location of each field, its size, the character of its soil, its drainage and its general crop history.

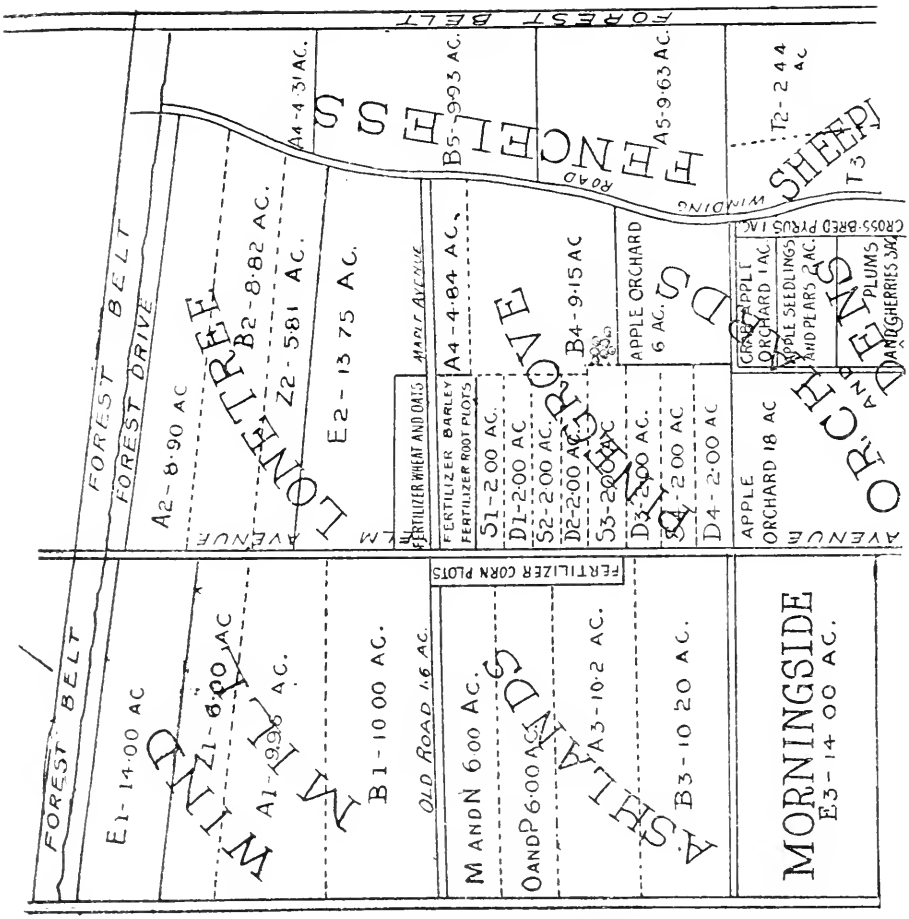
In the tables will be found all items of expenditure. The manure is applied in the same ratio to each field in each rotation. To illustrate: if to the corn land in Rotation 'Z,' 15 tons of manure per acre is applied; this is equivalent to 5 tons per acre per annum, as Z is a three year rotation. Then in applying manure to M, 30 tons per acre would be applied, as M is a six year rotation. Since the manure must vary slightly in quantity each year, $3 per annum per acre is charged in each rotation.

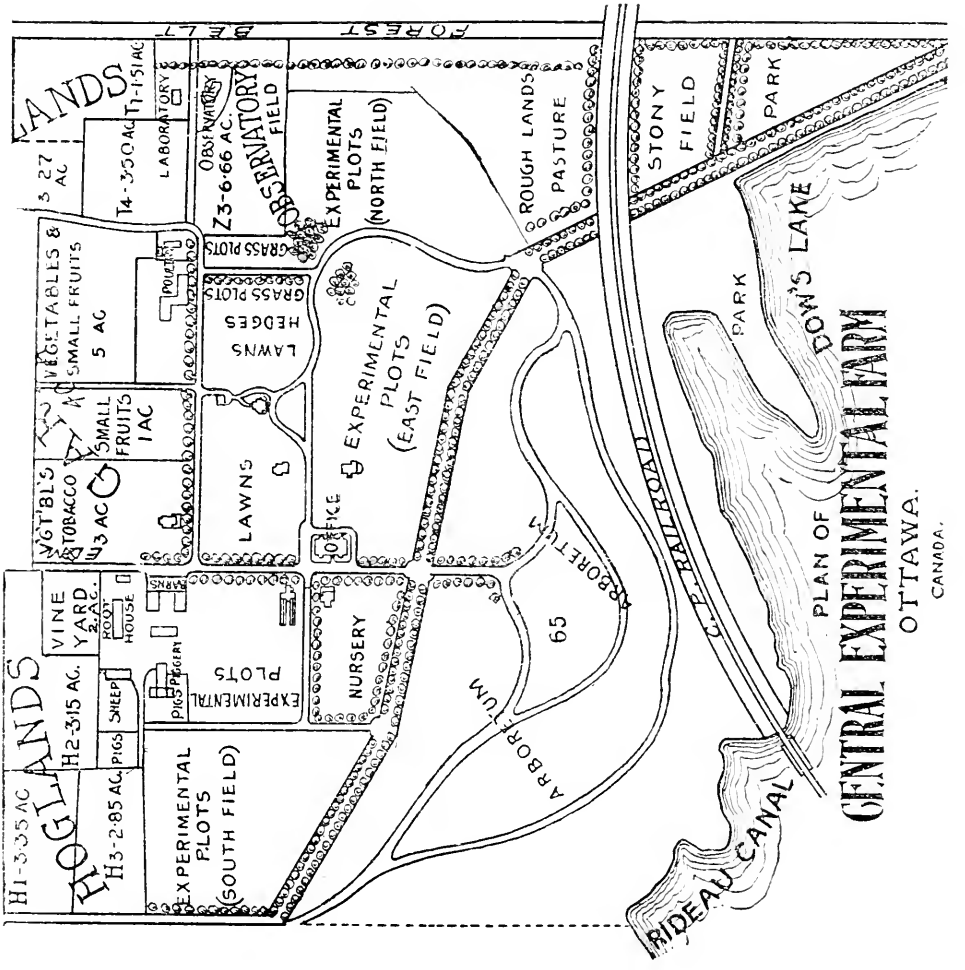
The total amount of each kind of crop material is divided so as to show the production capacity of one acre under each rotation.

ROTATION 'A.'

This rotation of five years' duration includes grain, Clover hay, Timothy or mixed hay, grain and corn in the order named. The grain crop mentioned first comes after corn. The corn stubble is torn up with a strong stiff-toothed cultivator run across, and angling to both right and left, of the direction of the rows. The surface soil and roots so loosened up are then ridged up in drills about 21 inches apart and 8 inches high. The drills are broken down the next spring by means of the disc harrow or stiff-toothed cultivator, harrowed once, and the field is ready to sow. Red clover 8 pounds, Alsike clover 1 pound, and Timothy seed 10 pounds per acre, is sown with the grain, and the land then rolled.

The clover field is mown as early as possible to insure a second crop. The mixed hay or Timothy is cut just as the bloom fades away, and a second cut is taken if growth warrants the expense of cutting. In any case the land is ploughed 4 inches deep about the end of August.


FOREST BELT
FOREST DRIVE
FOREST BELT
E1- 14·00 AC
A2- 8·90 AC
B2- 8·82 AC.
Z2- 581 AC.
A4- 4·31 AC.
B5- 9·93 AC.
A5- 9·63 AC.
T2- 2·44 AC
T3
E2- 13·75 AC.
MAPLE AVENUE
FERTILIZER WHEAT AND OATS
FERTILIZER BARLEY
FERTILIZER ROOT PLOTS
A4- 4·84 AC.
S1- 2·00 AC.
D1- 2·00 AC.
S2- 2·00 AC.
D2- 2·00 AC.
B4- 9·15 AC
S3- 2·00 AC.
D3- 2·00 AC.
S4- 2·00 AC.
D4- 2·00 AC
APPLE ORCHARD 6 AC.
APPLE ORCHARD 18 AC
CROSS-BRED PRUS 1 AC.
APPLE ORCHARD 1 AC.
APPLE SEEDLINGS AND PEARS 2 AC.
PLUMS
CURRANTS & GOOSEBERRIES 3 AC.
WINDING ROAD
SHEEP
AVENUE
Z1- 6·00 AC
A1- 9·96 AC.
B1- 10·00 AC.
OLD ROAD 1·6 AC.
FERTILIZER CORN PLOTS
M AND N 6·00 AC.
O AND P 6·00 AC.
A3- 10·2 AC.
B3- 10·20 AC.
E3- 14·00 AC.
MORNINGSIDE


CENTRAL EXPERIMENTAL FARM
PLAN OF
OTTAWA.
CANADA.
RIDEAU CANAL
C.P. RAILROAD
DOW'S LAKE
PARK
PARK
STONY FIELD
ROUGH LANDS
PASTURE
OBSERVATORY FIELD
Z3-6·66 AC.
OBSERVATORY
LABORATORY
T1-1·51 AC
T4-3·50 AC
3·27 AC
LANDS
EXPERIMENTAL PLOTS (NORTH FIELD)
GRASS PLOTS
POULTRY
VEGETABLES & SMALL FRUITS 5 AC
SMALL FRUITS 1 AC
VEGTBLS TOBACCO 3 AC
LAWNS
HEDGES
GRASS PLOTS
EXPERIMENTAL PLOTS (EAST FIELD)
OFFICE
LAWNS
ARBORETUM
65
ARBORETUM
NURSERY
EXPERIMENTAL PLOTS
PIGS PIGEON
SNAKE
VINE YARD 2 AC.
ROOT HOUSE
SHEEP
PIGS
H2-3·15 AC.
H3-2·85 AC.
H1-3·35 AC
FOREST BELT
EXPERIMENTAL PLOTS (SOUTH FIELD)
FOGLANDS

The grain crop mentioned second is sown after the Timothy or mixed hay. The land is ploughed shallow in August, harrowed and cultivated at intervals till October 15 or later, then put up into ridges by means of a double mould board plough. The seed is sown after the ridges are broken down in the spring, and with the oats 10 pounds of Red Clover to the acre is sown.

Corn follows this grain crop. The clover is allowed to grow within a day or two of the date on which it is desired to sow the corn. Meanwhile manure will have been spread upon the field in the fall, put there in small heaps during the winter and spread as soon as the land was bare, or spread from the wagon as early as possible in the spring. The Clover growing up through it facilitates the ploughing, which is done with a shallow wide furrow. The land is thoroughly disked, harrowed and then seeded with corn in rows 42 inches apart. It receives all the cultivation necessary to insure the retention of moisture and the killing of weeds between the rows.

A 1, 9·96 acres in Windmill is a long narrow, slightly rolling field, sand and muck predominating, but ranging to loam in spots, and is all underdrained.

It has given fairly good crops of all kinds in the past, 1902 oats, 1903 hay.

A 2, 8·90 acres in Lonetree; long, narrow, slightly rolling; sand to heavy loam in spots, mostly underdrained; fairly good crops; 1902 corn, 1903 oats.

A 3, 10·20 acres in Ashlands; oblong, slightly sloping to east and south; sand, heavy loam, muck and hardpan, mostly underdrained; fairly good crops; particularly good hay yields; 1902 hay, 1903 hay and pasture.

A 4, 9·15 acres, West Pine Grove and Fenceless; slightly sloping in Pine Grove; rolling in Fenceless; sand, muck loam to clay; underdrained; fair crops; 1902 oats, 1903 corn.

A 5, 9·63 acres Fenceless; square, rolling, sand loam, muck and clay, mostly underdrained; rather poor crops in past, save in case of hay; 1902 hay, 1903 oats.

There was nothing remarkable in connection with the crops on this rotation this year save that in A 2 there was some Alfalfa Clover as well as Red and Alsike.

ROTATION 'B.'

This rotation of five years' duration includes Grain, Clover, Hay, Grain, Clover Hay and Corn in the order named.

The grain crop mentioned first comes after corn. The treatment of the corn stubble is the same as in the case of Rotation 'A.' With the Grain is sown 10 pounds Red Clover, 1 pound Alsike and 5 pounds Timothy seed per acre. The Clover field mentioned first is cut twice, if possible, then ploughed about the end of August, cultivated and harrowed at intervals and ridged up late in October.

The Grain crop mentioned second is sown on a field treated as just described, the ridges being broken down in the spring by means of the disc harrow, and 10 lbs. Red Clover, 1 lb. Alsike and 5 lbs. Timothy seed per acre. The Clover field mentioned first is cut twice, if possible, then ploughed about the end of August, cultivated and harrowed at intervals and ridged up late in October.

The Grain crop mentioned second is sown on a field treated as just described, the ridges being broken down in the spring by means of the disc harrow, and 10 lbs Red Clover, 1 lb. Alsike and 5 lbs. Timothy sown with the grain.

The Clover field mentioned second is cut twice if possible, and the aftermath or third crop allowed to stand all winter.

Corn follows the Clover crop just mentioned. The treatment is exactly the same as described for corn in Rotation 'A.'

B 1, 10·00 acres, Windmill; long narrow field, nearly level; sand, sandy loam and muck; all underdrained but somewhat springy; most crops fair, Timothy hay particularly good; 1902 oats, 1903 hay.

B 2, 8·82 acres, Lonetree; long, narrow, slightly rolling; sand to medium loam, some black muck; mostly underdrained; fairly good crops; 1902 corn, 1903 oats.

B 3, 10·20 acres, Ashlands; oblong slightly rolling sand to heavy sandy or light clay loam; mostly underdrained; fairly good crops in past; 1902 hay, 1903 hay and pasture.

B 4, 9·15 acres, West Pine Grove; square slightly sloping to north-west; sand, sandy loam, muck and clay underdrained; fair crops, some bad spots; 1902 oats, 1903 corn.

B 5, 9·93, Fenceless; square fairly flat loam, clayey loam and clay, mostly clay, well underdrained; rather poor crops in past save in hay; 1902 hay; 1903 grain.

The crops on the various fields in this rotation in 1904 were uniformly fair; in A 1, owing to a new spring appearing, nearly an acre of corn was lost; in B 5 part of the field had been in pease in 1903, so had to be sown down to oat hay in the spring, and the rest of the field had had no timothy sown with the clover in 1903, and had in addition been tramped by the cattle in the fall of 1903, as it was not known then that it would be in hay in 1904.

ROTATION

This rotation of five years duration is that which has been followed for the

Lot.	Location.	Description of Soil. Sand.	Sandy Loam.	Clayey Loam.	Clay.	Black Muck.	Gravel.	Hardpan.	Area in Acres.	Crop.	Crop.	Rent and Manure.	Seed, Twine and use of Machinery.
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		1903.	1904.	$ cts.	$ cts.
A 1	W.S. 3	30	45	....	....	25	....	....	9·96	Hay	Hay	59 76	11 35
A 2	L.S. 1	30	65	5	....	....	....	....	8·90	Oats	"	53 40	17 44
A 3	A.S. 14	10	15	20	20	15	....	20	10·20	Pasture & hay.	Oats	61 20	16 32
A 4	W.P.G.S. 1, F.S. 1	70	20	10	....	....	....	....	9·15	Corn	"	54 90	14 53
A 5	F.S. 3	....	35	30	10	15	10	..	9·63	Grain	Corn	57 78	11 78
	Aggregate								47·84			287 04	71 42
	Average per acre								1			6 00	1 49

ROTATION

This rotation of five years duration is a modification

B 1	W.S. 4	5	35	5	50	5	....	....	10·00	Hay	Corn	60 00	12 00
B 2	L.S. 2	20	70	....	5	5	....	....	8·82	Oats	Hay	52 92	17 29
B 3	A.S. 15	20	60	5	....	15	....	....	10·20	Hay & pasture.	Oats	61 20	16 32
B 4	W.P.G.S. 2	20	60	15	....	5	....	....	9·15	Corn	Grain	54 90	14 53
B 5	F.S. 2	....	30	30	40	....	....	....	9·93	Grain	Hay	59 58	19 46
	Aggregate								48·10			288 60	79 60
	Average per acre								1			6 00	1 66

ROTATION 'E.'

This rotation of three years duration includes grain, pasture and corn.

The grain comes after the corn, the stubble of which is treated as described under Rotation 'A' With the grain in the spring is sown 10 lbs.red clover, 1 lb. alsike clover, 5 lbs. Alfalfa clover and 5 lbs. timothy seed per acre. If weather permits the field is pastured slightly in the fall.

After the grain crop the land is pastured, the grass seeding having been done with this object in view. In estimating the value of the returns from this field, pasture is charged at $1 per month per cow. At this rate the returns fall very far short of what would have been the returns if a hay crop had been harvested, if we may judge by the returns from 'Z 2.' This rotation and Rotation 'Z' were introduced into the list in order to gain some idea as to the difference in returns probable from land pastured and land from which all the crops are harvested. Of course, it is just possible that the corn crop after the pasture may in a measure make up for the difference in favour of the no pasture rotation 'Z.'

Corn follows the pasture. Manure is applied during the fall and winter and turned under with the growth of clover in the spring. The land is ploughed shallow

'A.'

last five years on the whole "200 acre farm." Area, 47·84 acres.

Items of Expense in Raising Crop of 1904.									Particulars of Crop of 1904.							
Manual Labour.		Horse Labour.														
No. of hours.	Cost of Manual Labour.	No. of hours with Team.	No. of hours with Single Horse.	Value of Horse Labour	Threshing.	Total Cost.	Cost for 1 Acre.	Grain.	Straw.	Hay.	Roots and Ensilage.	Total Value.	Value of Crop per Acre.	Profit per Acre in 1904.
Hrs.	$ cts.	Hrs	Hrs	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
144	19 20	48	27	16 73	.....	107 04	10 75	.....	.....	44,000	.....	154 00	15 46	4 71
207	27 52	50⅝	35⅝	18 88	....	117 24	13 17	.....	.....	77,483	.....	271 19	30 47	17 30
43	5 74	163	....	40 75	13 14	137 15	13 44	22,114	25,333	.....	.....	271 81	26 65	13 31
38	5 07	118½	...	29 55	7 94	112 09	12 24	13,236	20,711	.....	.....	172 76	18 54	6 30
452	60 25	278	26	74 65	.....	203 86	21 17	.....	.....	.....	279,060	279 06	28 98	7 81
884	117 78	657½	88⅝	179 96	.....	677 38	14 37	35,350	46,044	121,483	279,060	1,154 82	24 33	9 96
18·48	2 46	13⅝	1⅞	3 76	.....	14 37	14 37	738	962	2,537	5,833	24 33	24 33	9 96

'B.'

of Rotation "A." Area, 48·10 acres.

470	62 65	292	28	77 90	....	212 55	21 25	.....	.....	.....	216,755	216 75	21 67	0 42
205	27 33	50⅝	35⅝	18 71	.....	116 25	13 18	.....	.....	76,787	.....	268 75	30 47	17 29
43	5 74	163	....	40 75	11 31	135 32	13 27	18,848	28,516	.....	.....	245 51	24 07	10 80
38	5 07	118½	....	29 55	7 94	112 09	12 24	13,722	22,118	.....	.....	181 45	19 83	7 59
202	26 94	48	43	19 52	....	125 50	12 64	.....	....	63,430	.....	222 00	22 35	9 71
958	127 73	671½	66½	186 43	....	701 71	14 59	32,570	50,634	140,217	216,755	1,134 41	23 58	8 99
19·9	2 65	13 9	1·38	3 87	.....	14 59	14 59	677	1,052	2,914	4,506	23 58	23 58	8 99

and disc harrowed, the corn is then sown in rows 42 inches apart and receives the usual treatment during the rest of the season.

E 1, 14·00 acres. Windmill; rolling land, well drained; sand, sandy loam, small amount clayey loam; good crops; 1902, oats; 1903, hay.

E 2, 13·75. Lonetree; rolling land, well underdrained; sand, sandy loam, muck, small amount clay and clayey loam; good crops; 1902, corn; 1903, oats.

E 3, 14·00 acres, Morningside; rolling land, well drained; sand, sandy loam, small amount clayey loam; good crops; 1902, pasture; 1903, grain.

ROTATION 'Z.'

This rotation of 3 years' duration includes corn, grain and clover hay, in the order named.

Corn comes after the clover hay. The manure is applied in the fall or during the winter and spring and the clover allowed to grow up through it, so facilitating the turning of the whole mass of manure and spring growth and late fall growth of

ROTATION

This rotation of three years duration includes

Lot.	Location.	Description of Soil.							Area in acres.	Crop.	Crop.	Rent and manure.	Seed, twine and use of machinery.
		Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.					
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	Ac.	1903.	1904.	$ cts.	$ cts.
E 1	W.S. 1	40	40	...	...	15	5	...	14·00	Hay	Corn	84 00	16 80
E 2	L.S. 4	10	60	10	...	20	....	....	13·75	Oats	Pasture	82 50	25 57
E 3	Morn	30	60	5	....	5	....	....	14·00	Grain	Oats	84 00	22 40
	Aggregate								41·75			250 50	64 77
	Average per acre								1·00			6 00	1 55

ROTATION

This rotation of three years duration

Z 1	W.S. 2	40	40	....	....	15	5	....	6·00	Hay	Corn	36 00	7 80
Z 2	L.S. 3	10	60	10	....	20	....	....	5·81	Oats	Hay	34 86	11 38
Z 3	Obs. S	10	60	20	10	....	....	....	6·66	Hay	Oats	40 00	10 65
	Aggregate								18·47			110 86	29 83
	Average per acre								1·00			6 00	1 61

clover under a few days before the corn is to be sown. The furrow turned is quite shallow, about 5 inches deep, and the land is then thoroughly disc-harrowed and the corn sown in rows 42 inches apart. It receives later the usual cultivation and care.

Grain follows corn, the land having been prepared as described under Rotation 'A. With the grain there is sown 10 lbs. red clover, 1 lb. alsike and 5 lbs. Timothy seed.

The hay is cut twice and the last aftermath allowed to grow up to be turned under the next spring.

Z 1, 6·00 acres, Windmill; long narrow field; sand, muck, heavy loam underdrained; rolling land; crops usually good, 1902, oats; 1903, hay.

Z 2, 5·81 acres, Lonetree; long narrow field of rolling land, sand, muck, sandy loam; underdrained; fair crops; 1902, corn; 1903, oats.

Z 3, 6·66 acres, Observatory; irregular square; sand, sandy loam, clayey loam, clay; underdrained; good crops; 1902, hay; 1903, hay.

ROTATION 'H.'

This rotation is of three years duration and includes roots, soiling crop and pasture in the order named. The land is plowed late in the fall after it has been manured. It is disked the next spring and the roots sown on ridges. The roots receive the usual cultivation and are of a varied character, including mangels, sugar mangels,

'E.'

pasture and has an area 41·75 acres.

Items of Expense in Raising Crop of 1904.								Particulars of Crop of 1904.						
Manual Labour.		Horse Labour.												
No. of hours.	Cost of manual labour.	No. of hours with team.	No. of hours with single horse.	Value of horse labour.	Threshing.	Total cost.	Cost for 1 acre.	Grain.	Straw.	Hay.	Roots and ensilage.	Total value.	Value of crop per acre.	Profit per acre in 1904.
Hrs.	$ cts.	Hrs	Hrs	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
658¼	87 54	417⅝	38	111 00	.....	299 34	21 38	.....	.....	.....	382,116	382 12	27 29	5 91
...	...	....	....	...	.....	108 07	7 85	... ...	.....	*143	.....	143 00	10 41	2 56
135	17 99	193	....	48 25	12 85	185 49	13 25	21,413	32,781	.....	.....	279 69	19 98	9 13
793¼	105 53	610⅝	....	159 25	.....	592 90	.....	21,413	32,781	143	382,116	592 90	... ...	... ...
19	2 53	146	....	3 82	.....	14 20	14 20	512	785	3·42	9,152	19 28	19 28	5 08

* Hay not cut but field furnished pasturage equivalent to 1 cow on pasture for 143 mos.

'Z.'

includes an area of 18·47 acres.

282	37 60	179	16½	47 89	.....	129 29	21 55	.....	.....	.....	163,764	163 76	27 28	5 73
136	18 15	33	23⅕	12 11	.....	76 50	13 17	.....	...	50,756	.....	177 64	30 47	17 30
36	4 80	90	....	22 50	6 92	84 87	12 74	11,520	17,160	.... ..	.....	161 93	24 32	11 58
454	60 55	202	39⅝	82 50	.....	290 66	15 73	11,520	17,160	50,756	163,764	503 53	27 25	.....
24·57	3 27	16·35	2·14	4 46	.....	15 73	15 73	623	929	2,748	8,866	27 25	27 25	11 52

sugar beets and turnips devoted to pork production for the most part, the surplus being sold to cattle and the returns invested in meal for pig feeding.

The soiling crop field is sown with various crops suitable for feeding to pigs. What is over and above the amount possible of consumption by pigs is sold to cattle at $2 per ton and the returns used to purchase meal for pork production.

The pasture area is divided into several parts, the seed being sown as far as possible at the same time as the soiling crops the previous year and not allowed to be eaten too close the first fall, although any good growth is not wasted.

H 1, 3·35 acres, Hoglands; rolling, sand and sandy loam; underdrained; 1902, pasture; 1903, oats.

H 2, 3·15 acres, Hoglands; rolling, sand, hardpan, loam, clayey loam; underdrained; 1902, pasture; 1903, grain.

H 3, 2·85 acres, Hoglands; sloping north; clayey loam, clay, sandy loam, sand; underdrained; 1902, pasture; 1903, rape and hog pasture.

'Sheep Farm.'

This rotation of four years duration includes roots, grain, hay, pasture.

The area devoted to sheep farming is rather limited, about 10·72 acres. This area is not included in the '200 acre farm.' The whole field had been for several years

ROTATION

This rotation of three years duration includes an area of 9·35 acres.

Lot.	Location.	Description of Soil.							Area in Acres.	Crop.	Crop.	Rent and Manure.	Seed, Twine and use of Machinery.
		Sand.	Sandy Loam.	Clayey Loam.	Clay.	Black Muck.	Gravel.	Hardpan.					
		p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	Ac.	1903.	1904.	$ cts.	$ cts.
H 1	H.S. 1	30	40	20	10	....	....	....	3·35	Grain	Pasture and hay.	20 10	5 35
H 2	H.S. 2	25	45	20	10	....	....	....	3·15	"	Roots	18 90	3 69
H 3	H.S. 3	10	20	50	20	....	....	....	2·85	Rape and pasture.	Pasture and soiling crop.	17 10	3 65
	Aggregate								9·35			56 10	12 69
	Average per acre								1			6 00	....

ROTATION

This rotation of four years duration is devoted to

Lot.	Location.	Description of Soil.							Area in Acres.	Crop.	Crop.	Rent and Manure.	Seed, Twine and use of Machinery.
		Sand.	Sandy Loam.	Clayey Loam.	Clay.	Black Muck.	Gravel.	Hardpan.					
		p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	Ac.	1903.	1904.	$ cts.	$ cts.
T 1	S.S. 1	10	90	....	....	....	....	....	1·51	Pasture	Roots and soiling.	9 06	3 90
T 2	S.S. 2	15	85	....	....	....	....	....	2·44	Rape, pastured	Rape, p'std	14 64	2 43
T 3	S.S. 3	....	100	....	....	....	....	....	3·27	Pasture	Soiling	19 62	6 98
T 4	S.S. 4	15	85	....	....	....	....	....	3·50	"	Pasture	21 60	6 69
	Aggregate								10·72			64 32	19 31
	Average per acre											6 00	1 80

devoted to pasturing sheep, but it has been divided into four rather unequal fields susceptible of further subdivision and devoted to a rotation considered suitable for sheep.

'H.'

It is as far as possible devoted to pork production.

Items of Expense in Raising Crop of 1904.								Particulars of Crop of 1904.						
Manual Labour.		Horse Labour.												
No. of Hours.	Cost of Manual Labour.	No. of hours with Team.	No. of hours with single Horse.	Value of Horse Labour.	Threshing.	Total Cost.	Cost for one Acre.	Grain.	Pasture for Pigs.	Hay.	Roots and Green Feed.	Total Value.	Value of Crop per Acre.	Profit per Acre in 1904.
	$ cts.	Hrs	Hrs	$ cts.	$	$ cts.	$ cts.	Lbs.	Mos.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
2	0 27	5	2	1 60	.....	27 32	8 15	.....	63	3,580	14,570	38 70	11 55	3 40
493	65 61	32	28	12 90	.....	101 10	32 10	.....	.....	.....	132,570	132 57	42 09	9 99
.....	.....	23½	.....	5 87	.....	26 62	9 34	.....	10	.....	42,735	44 73	15 69	6 35
495	65 88	60½	30	20 37	.....	155 04	.....	.....	.....	3,580	189,875	216 00	23 10	6 52
.....	.....	.....	.....	.....	.....	16 58	16 58	.....	7·89	382	20,307	23 10	23 10	6 52

'T.'

Sheep, it includes an area of 10·72 acres.

Items of Expense in Raising Crop of 1904.								Particulars of Crop of 1904.						
Manual Labour.		Horse Labour.												
No. of Hours.	Cost of Manual Labour.	No. of hours with Team.	No. of hours with single Horse.	Value of Horse Labour.	Threshing.	Total Cost.	Cost for one Acre.	Grain.	Sheep on Pasture.	Hay.	Roots, Ensilage and Soiling Crop.	Total Value.	Value of Crop per Acre.	Profit per Acre in 1904.
	$ cts.	Hrs	Hrs	$ cts.	$	$ cts.	$ cts.	Lbs.	Mos.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
100	13 33	13½	.....	3 37	.....	29 66	19 64	.....	.....	.....	30,684	39 68	29 32	0 68
2	0 27	16	.....	4 00	.....	21 34	8 75	.....	87·1	.....	.....	17 42	7 14	*1 61
.....	.....	34	.....	8 50	.....	35 10	10 73	.....	73·5	.....	40,315	55 02	16 82	6 12
.....	.....	.....	.....	.....	.....	27 00	7 71	.....	143·6	.....	.....	28 72	8 21	0 50
102	13 60	63½	.....	15 87	.....	113 10	.....	.....	304·2	.....	70,999	131 84	12 30	1 75
9½	1 27	6	.....	1 48	.....	10 55	10 55	.....	28·22	.....	6,623	12 29	12 30	1 75

* Loss.

The root field is devoted to white turnips, Swedes, cabbage, Kohl Rabi, thousand headed kale, rape, &c. It comes after the pasture, the land being manured and plowed in the fall.

ROTATION

Four year rotation, with Deep

Lot.	Location.	Description of Soil.							Area in Acres.	Crop.	Crop.	Rent and Manure.	Seed, Twine and use of Machinery.
		Sand.	Sandy Loam.	Clayey Loam.	Clay.	Black Muck.	Gravel.	Hardpan.					
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		1903.	1904.	$ cts.	$ cts.
D 1	E.P.G.S. 2..	20	80	....	....	....	....	....	2	Corn.....	Oats.....	12 00	3 20
D 2	" 4..	20	80	....	....	....	....	....	2	"	Oat hay...	12 00	2 60
D 3	" 6..	30	70	....	....	....	....	....	2	"	" ..	12 00	2 60
D 4	" 8..	60	40	....	....	....	....	....	2	Roots	Roots	12 00	2 35
	Aggregate.....								8	.....	.....	48 00	10 75
	Average per Acre								1	.....	.....	6 00	1 34

ROTATION

Four year rotation, with Shallow

S 1	E.P.G.S. 1..	20	80	....	....	....	....	....	.....	Corn.....	Oats.....	12 00	3 20
S 2	" 3..	20	80	....	....	....	....	....	.....	"	Oat hay..	12 00	2 60
S 3	" 5..	30	70	....	....	....	....	....	.....	"	" ..	12 00	2 60
S 4	" 7..	60	40	....	....	....	....	....	.....	"	Roots	12 00	2 35
	Aggregate									.....	.....	48 00	10 75
	Average per Acre...									.....	.....	6 00	1 34

Grain follows the root land, and with the grain various clovers and grass seeds are sown to prepare for the ensuing two years. The grain may be harvested or used as soiling crop for sheep.

The hay field is expected to give one crop of hay and then be devoted to pasture for lambs as soon as they are weaned.

The pasture field is the field that has been hay the previous year. Alfalfa, Red clover, Alsike clover, Bromus inermis and Timothy are the clovers and grasses used.

T 1, 1·51 acres, Sheeplands; fairly level, quite stony, light loam; always in pasture till 1904.

T 2, 2·44 acres, Sheeplands; quite level loamy; 1902, grain; 1903, rape.

T 3, 3·27 acres, Sheeplands; rolling, very stony shallow light loam soil; always in pasture till 1904.

T 4, 3·50 acres, Sheeplands; slightly rolling sand, sandy loam; 1902, hay; 1903, pasture.

ROTATION 'D.'

Deep Ploughing.

This rotation is of four years' duration and includes grain, clover hay, mixed clover and timothy hay and roots.

SESSIONAL PAPER No. 16

'D.'

late Fall Plowing Area 8 acres.

Items of Expense in Raising Crop of 1904.								Particulars of Crop of 1904.						
Manual Labour.		Horse Labour.			Threshing.	Total Cost.	Cost for 1 Acre.	Grain.	Straw.	Hay.	Roots and Ensilage.	Total Value.	Value of Crop per Acre.	Profit per Acre in 1904.
No. of Hours.	Cost of Manual Labour.	No. of hours with Team.	No. of hours with single Horse.	Value of Horse Labour.										
Hrs.	$ cts.	Hrs	Hrs	$ ts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
20	2 67	23½	....	5 85	1 15	24 87	12 43	1,916	5,344	.....	.....	29 85	14 92	2 48
57	7 60	25⅝	13	8 63	.....	30 83	15 41	.....	.....	9,553	.....	33 37	16 68	1 27
57	7 60	25⅝	13	8 63	.....	30 83	15 41	.....	.....	9,553	.....	33 37	16 68	1 27
323⅜	43 15	44½	23	15 15	.....	72 65	36 32	.....	.....	.....	87,245	87 25	43 62	7 30
457⅜	61 02	118⅜	49	38 26	.....	159 18	...	1,916	5,344	19,106	87,245	183 84	22 98	3 09
57⅛	7 63	14¾	6½	4 78	.....	19 89	19 89	239·5	668	2,388	10,905	22 98	22 98	3 09

'S.'

early Fall Plowing Area 8 acres.

20	2 67	23½	....	5 85	1 15	24 87	12 43	1,916	5,344	.....	.....	29 85	14 92	2 48
57	7 60	25⅝	13	8 63	.....	30 83	15 41½	....	....	9,553	.....	33 37	16 68	1 27
57	7 60	25⅝	13	8 63	.....	30 83	15 41½	....	....	9,553	.....	33 37	16 68	1 27
323⅜	43 15	44½	23	15 15	.....	72 65	36 32	....	....	.....	87,245	87 25	43 62	7 30
457⅜	61 02	118⅜	49	38 26	....	159 18	.....	.....	.....	19,066	87,245	183 84	22 98	3 09
57⅛	7 63	14¾	6½	4 78	.....	19 89	19 89	239·5	668	2,383	10,905	22 98	22 98	3 09

The grain crop is sown after roots. After the roots are harvested the land is ploughed 5½ inches deep, and then left till the next spring, when it is harrowed and seeded to oats. With the grain is sown 10 pounds Red clover, 1 pound Alsike clover and 10 pounds Timothy seed per acre.

The clover hay is cut twice in the season, and the second aftermath left on the field, *i.e.*, it is not pastured off.

The mixed clover and timothy hay is cut twice if possible and plowed 7 inches deep early in October. Manure is applied and the land replowed in the spring with a shallower furrow.

The roots are sown on ridges drilled up after the spring ploughing, and receive the usual cultivation.

D 1, 2 acres, East Pine Grove; slopes to north-west, is partly underdrained; sand to rather heavy sandy loam; has given fair crops for most part, but has small 'bad land' spots; 1902, oats; 1903, corn.

D 2, 2 acres, East Pine Grove; slopes from both ends to centre; underdrained; sand to heavy loam; has given good crops for most part, but has some 'bad land' spots; 1902, oats; 1903, corn.

D 3, 2 acres, East Pine Grove; slopes from both ends to centre; underdrained; sand to sandy loam, underdrained; good crops; 1902, oats; 1903, corn.

ROTATION

This rotation of six years

Lot.	Location.	Description of Soil.							Area in acres.	Crop.	Crop.	Rent and manure.	Seed, twine and use of machinery.
		Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.					
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	Ac.	1903.	1904.	$ cts.	$ cts.
M 1	A.S. 2		30	15		45		10	1	Meadow and pasture.	Oats	6 00	1 60
M 2	A.S. 4		30	15		45		10	1	"	Oat hay	6 00	1 30
M 3	A.S. 6		30	15		45		10	1	"	"	6 00	1 30
	Aggregate								3			18 00	4 20
	Average per acre								1			6 00	1 40

ROTATION

This rotation of six years duration includes no clover save such

N 1	A.S. 3		30	15		45		10	1	Meadow and pasture.	Oats	6 00	1 60
N 2	A.S. 5		30	15		45		10	1	"	Oat hay	6 00	1 30
N 3	A.S. 7		30	15		45		10	1	"	"	6 00	1 30
	Aggregate								3			18 00	4 20
	Average per acre								1			6 00	1 40

D 4, 2 acres, East Pine Grove; slopes to south-east; sandy loam; partly underdrained; good crops; 1902, oats; 1903, roots.

ROTATION 'S.'

Shallow Ploughing.

This rotation is of 4 years' duration, and includes grain, clover hay, mixed clover and timothy hay and roots.

The grain crop is sown after roots. After the roots are harvested in the fall, the land is ploughed shallow, 4 inches deep, and then left till the next spring, when it is harrowed and seeded to oats. With the grain is sown 10 pounds red clover, 1 pound alsike clover and 10 pounds timothy seed per acre.

The clover hay is cut twice in the season and the second aftermath left on the field; that is, it is not pastured off, as is usually done.

The mixed clover and timothy hay is cut twice if possible, and in August the land ploughed with a shallow furrow (exactly 4 inches deep). The land is kept cultivated and harrowed at intervals till late October, when it is ridged up with the double mould board plough. To this field destined for roots, manure is applied during the winter,

'M.'

duration includes the clover hay. Area 3 acres.

Items of Expense in raising Crop of 1904.								Particulars of Crop of 1904.						
Manual Labour.		Horse Labour.												
No. of hours.	Cost of manual labour.	No. of hours with team.	No. of hours with single horse.	Value of horse labour.	Threshing.	Total cost.	Cost for 1 acre.	Grain.	Straw.	Hay.	Roots and ensilage.	Total value.	Value of crop per acre.	Profit per acre in 1904.
Hrs.	$ cts.	Hrs	Hrs	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
4	0 53	16	....	4 00	0 90	13 04	13 04	1,493	3,182	....	.....	21 29	21 29	8 25
15	2 00	16½	....	4 12½	...	13 60	13 60	....	..	3,670	.....	12 85	12 85	*0 75
15	2 00	16½	...	4 12½	...	13 60	13 60	....	....	3,670	.....	12 85	12 85	*0 75
34	4 53	49	....	12 25	.....	40 24	13 41	1,493	3,182	7,340	.... ..	46 99	15 66	2 25
11⅓	1 51	16⅓	...	4 08	.... .	13 41	13 41	498	1,061	2,447	... ...	15 66	15 66	2 25

* Loss.

'N.'

as may happen to get into the field from unknown sources. Area 3 acres.

4	0 53	16	...	4 00	0 90	13 04	13 04	1,493	3,182	.....	.....	21 29	21 29	8 25
15	2 00	16½	....	4 12½	.. ...	13 60	13 60	.....	.....	3,670	.....	12 85	12 85	*0 75
15	2 00	16½	....	4 12½	.. ...	13 60	13 60	.....	...	3,670	... . ..	12 85	12 85	*0 75
34	4 53	49	. ..	12 25	0 90	40 24	13 41	1,493	3,182	7,340	.....	46 99	15 66	2 25
11⅓	1 51	16⅓	....	4 08	0 30	13 41	13 41	498	1,061	2,447	.....	15 66	15 66	2 25

* Loss.

disked in the spring and the land again ridged up and sown to roots, which receive the usual cultivation.

S 1, 2 acres, East Pine Grove; slopes to north-west; is partly underdrained; sand to rather heavy sandy loam; has given fair crops for most part, but has small 'bad land' area; 1902, oats; 1903, corn.

S 2, 2 acres, East Pine Grove; slopes from both ends to centre; sand to heavy loam; underdrained for most part; has given good crops for most part but has some 'bad land' spots; 1902, oats; 1903, corn.

S 3, 2 acres, East Pine Grove; slopes from both ends to centre, underdrained; sand to sandy loam, underdrained; good crops; 1902, oats; 1903, corn.

S 4, 2 acres, East Pine Grove; slopes to south-east; sandy loam; partly underdrained; good crops; 1902, oats; 1903, corn.

ROTATION 'M.'

This rotation of six years duration includes in its crops grain, grain, clover hay and then Timothy hay or mixed hay for three years.

The first year, grain is sown on sod plowed late in the fall. In the spring the land is disked, harrowed and sown with 10 pounds of red clover seed per acre at the same

ROTATION

This rotation of three years duration has no

Lot.	Location.	Description of Soil.							Area in acres.	Crop.	Crop.	Rent and manure.	Seed, twine and use of machinery.
		Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.					
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	Ac.	1903.	1904.	$ cts.	$ cts.
O 1	A. S. 8.	....	30	15	....	45	....	10	1	Meadow and pasture.	Oat hay	6 00	1 30
O 2	A. S. 10	....	30	15	....	45	....	10	1	"	"	6 00	1 30
O 3	A. S. 12	....	30	15	....	45	....	10	1	"	Oats	6 00	1 60
	Aggregate								3			18 00	4 20
	Average per acre								1			6 00	1 40

ROTATION

This rotation of three years duration

P 1	A. S. 9	....	30	15	....	45	....	10	1	Meadow and pasture.	Oat hay	6 00	1 30
P 2	A. S. 11	....	30	15	....	45	....	10	1	"	"	6 00	1 30
P 3	A. S. 13	....	30	15	....	45	....	10	1	"	Oats	6 00	1 60
	Aggregate								3			18 00	4 20
	Average per acre								1			6 00	1 40

time as the grain is sown. After the grain is harvested the clover is allowed to grow as late as possible and the land plowed the last thing in the fall. The next spring 8 pounds of Red clover and 10 pounds Timothy seed is sown with the grain and the land put in as good shape as possible.

Clover hay follows the second year grain. It is cut twice in the year and the last aftermath not pastured.

Timothy hay or mixed hay then occupies the land for three consecutive years. Manure is applied in the fall of the second year that the field is under hay.

M 1, 1 acre, Ashlands; long narrow field, sandy loam, clayey loam, black muck, hardpan; underdrained; good crops; 1902, hay; 1903, hay and pasture.

M 2, and M 3, are quite similar to M 1 in every respect.

The crops of hay on M 2 and M 3 this year should not be taken as a fair sample of what may be expected from these fields in the future as it was impossible to have them under the right kind of hay the first year and so they were put under oat hay.

ROTATION 'N.'

This rotation of six years duration includes in its crops grain, grain and Timothy hay for four years.

The first years grain is sown on land that had been plowed six inches deep the fall previous. No grass or clover seed of any kind is sown with it. The stubble is plowed

'O.'

clover included in its crops. Area 3 acres.

Items of Expense in Raising Crop of 1904.								Particulars of Crop of 1904.						
Manual Labour.		Horse Labour.			Threshing.	Total cost.	Cost for 1 acre.	Grain.	Straw.	Hay.	Roots and ensilage.	Total value.	Value of crop per acre.	Profit per acre in 1904.
No. of hours.	Cost of manual labour.	No. of hours with team.	No. of hours with single horse.	Value of horse labour.										
Hrs.	$ cts.	Hrs	Hrs	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
15	2 00	16½	....	4 12½	.....	13 60	13 60	.....	.....	3,670	.....	12 85	12 85	*0 75
15	2 00	16½	...	4 12½	.....	13 60	13 60	.....	....	3,670	.....	12 85	12 85	*0 75
4	0 53	16	....	4 00	1 30	13 43	13 43	2,169	2,482	.....	.....	26 65	26 65	13 22
34	4 53	49	...	12 25	1 30	40 63	13 54	2,169	2,482	7,340	.....	52 35	17 45	3 91
11⅓	1 51	16⅓	....	4 08	0 43	13 54	13 54	723	827	2,447	.....	17 45	17 45	3 91

*Loss.

'P.'

includes clover. Area 3 acres.

15	2 00	16½	....	4 12½	....	13 60	13 60	.....	.....	3,670	.....	12 85	12 85	*0 75
15	2 00	16½	...	4 12½	....	13 60	13 60	....	....	3,670	.....	12 85	12 85	*0 75
4	0 53	16	....	4 00	1 30	13 43	13 43	2,169	2,482	.....	.....	26 65	26 65	13 22
34	4 53	49	....	12 25	1 30	40 63	13 54	2,169	2,482	7,340	.....	52 35	17 45	3 91
11⅓	1 51	16⅓	·43	4 08	0 43	13 54	13 54	723	827	2,447	....	17 45	17 45	3 91

*Loss.

in the fall and with the grain of the second year Timothy seed is sown at the rate of 12 pounds per acre. Every care is taken to insure a good catch and the land put in as good shape as possible to remain in meadow four years.

Timothy hay is then the crop for four years, manure being applied in the fall of the second year of hay.

N 1, 1 acre, Ashlands; long narrow field, sandy loam, clayey loam, black muck, hardpan; well underdrained; good crops; 1902, hay; 1903, hay and pasture.

N 2, and N 3 are quite similar to N 1 in every particular.

ROTATION 'O.'

This rotation is of three years duration and includes grain, timothy hay, timothy hay.

The field intended for grain is ploughed early in the fall and cultivated at intervals to insure the sod rottening. It is ploughed again late in the fall and with the grain, the next spring, timothy seed is sown at the rate of 12 lbs. to the acre.

Timothy hay is cut for two years and the land again ploughed early in the fall. Manure is applied in the fall of the first year under hay.

It was impossible to get the proper fields under timothy hay for this year, so it was necessary to sow oat hay. The results were not very satisfactory, so this year's

crop on O 1 and O 2 need not be taken as an example of what may be expected from these fields in the future.

O 1, 1 acre, Ashlands, long narrow field, rolling, sandy loam, clayey loam, black muck, hardpan; underdrained, good crops; 1902, hay; 1903, hay and pasture.

O 2, and O 3 are similar to O 1 in every particular.

ROTATION 'P.'

This rotation is of three years duration and includes grain, clover hay, and timothy hay or mixed hay.

The field intended for grain is ploughed early the previous fall and cultivated at intervals to insure the sod rotting. It is again ploughed late in the fall and left till seed time the next spring. With the grain is sown ten pounds clover and ten pounds timothy.

Manure is applied in the fall of the first year hay.

P 1, 1 acre, Ashlands; long narrow rolling sandy loam, clayey loam, black muck, hardpan; underdrained; good crops; 1902, hay; 1903, hay and pasture.

EXPERIMENTS WITH GRASSES AND CLOVERS FOR HAY.

Some further experiments to gain some information as to the comparative economy of different mixtures of grasses and clovers have been carried on during the year.

In comparison with the usual grass mixture of eight pounds timothy and ten pounds red clover, there were tested several others not so commonly used. Bromus inermis, orchard grass, alfalfa and alsike were the other grasses and clovers used. The following table gives full particulars of the different plots tested.

Particulars of seeding and returns in hay are as follows:—

—	Seed sown per acre.				Yield of Hay July 5.		Yield of Hay Aug. 18.		Total yield Hay per lot.		Total yield Hay per acre.		Yield Green Feed Oct. 7.
	Grasses.	Lbs.	Clovers.	Lbs.									
					Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons. lbs.
Plot 1, 3½ acres	Timothy	10	Common Red	8	11	1,220	4	760	15	1,980	4	1,137	.....
Plot 2, 5 acres	Timothy Bromus Inermis Orchard grass	4 8 8	..... Alfalfa Common Red	8 6	16	42	6	520	22	560	4	912	7 330 put in silo
Plot 3, 5 acres	Timothy Bromus Inermis Orchard	4 8 8	Alsike Common Red Alfalfa	2 6 2	18	1,267	5	1,970	24	1,337	4	1,867	.....
Plot 4, 5 acres	Timothy Orchard	5 16	Alsike Common Red	2 6	12	1,072	6	1,690	19	762	3	1,752	.....
Plot 5, 5 acres	Timothy Bromus Inermis	5 15	Alsike Common Red	2 6	13	192	7	190	20	382	4	76	.....
Total ...	.....	91		48	71	1,793	30	1,150	102	1,021	4	943	7 330

Very little need be said in explanation or amplification of the above.

The early part of the season was very suitable for hay, and the first cut was most excellent in quality and large in quantity.

July and August were dry months in the Ottawa district, and consequently the second cut was quite light.

Plot 2, the seed on which included 8 pounds Alfalfa, was cut a third time, October 7, and the material (about 78 per cent Alfalfa) put in the experimental silo.

PASTURE.

None of these particular plots was pastured in 1904. A plot of 13·75 acres seeded with 10 pounds Timothy and 8 pounds Common Red clover was under pasture. This plot had been seeded down with oats the previous year. It made a very rapid growth in the spring, and the cattle were turned in May 20.

During the season 4,290 days' pasture was furnished by the 13·75 acres. This amount of pasture at $1 per month per head would be worth $143, or $10.41 per acre.

A field of 5·81 acres of similar seeding yielded during the season 25 tons, 763 pounds hay worth at $7 per ton $177.67. It will, however, be remembered that to harvest the hay cost considerable, about $1.66 per ton.

YIELDS AND COST OF VARIOUS CLASSES OF HAY.

In the following statement of cost of producing 1 ton and 1 acre of various sorts of hay and hay mixtures, labour, seed, rent and manure are all considered. Where more than one crop was harvested in the year the seed rent and manure were, of course, counted only once.

Kind of Hay.	Amount seed.	Cost per Acre to grow.	Cost per Ton to produce.	Yield per Acre.	Value of Hay per Ton.	Remarks.
		$ cts.	$ cts.	Tons. lbs.	$ cts.	
Timothy	10	10 75	4 87	2 400	8 00	
Timothy	10	13 17	2 90	4 1,137	7 00	
R. Clover	8					
Alfalfa	8					
Timothy	4	13 90	3 10	4 912	7 00	A further aftermath cut for silage not considered in this estimate.
Brome	8					
Timothy	8	13 77	2 82	4 1,800	7 00	
Alsike	6					
Oat hay	68	13 60	7 40	1 1,670	7 00	
Oat and Pea hay	50	15 41	6 46	2 766	7 00	
" "	30					

TIMOTHY.

Timothy is of course the favourite hay for horses. It is, however, usually expensive to produce since it yields only one crop in the season, and two tons is considered a very good yield per acre. Freedom from dust, good keeping qualities, palatability and wholesomeness are its chief recommendations. It depletes the soil of fertility to a certain extent and very few fields should be left longer than two years under this crop.

TIMOTHY AND CLOVER.

Timothy and Red Clover mixed is a hay that, if well made, can scarcely be surpassed for any class of live stock, combining as it does in itself, palatability, wholesomeness, high digestibility, and high nutritive qualities. It is better for horses than

pure Timothy, and should be fed much more extensively than is at present the case in this country, provided, of course, that it is well made.

The Red Clover part of the mixture adds to the fertility of the soil and makes up in some measure for the loss entailed by the growing of the Timothy along with it.

ALFALFA.

Alfalfa, Timothy and Brome makes a most excellent hay for cattle of all descriptions and horses do very well on it. The Alfalfa part of the mixture increases the nitrogen content of the soil, but the other two constituents of the mixture are soil robbers.

TIMOTHY AND ALSIKE.

Timothy and Alsike is a hay of a very high value for cattle, but not so good for horses. Timothy is, of course, again a factor in lowering the fertility of the soil, but the Alsike being a perennial clover may be expected to replace at least a portion of the nitrogen removed.

OAT HAY.

Oat hay is not a hay that can be recommended to the farmers of this country, as it is expensive, only fairly palatable and not highly nutritious. To give the best results it must be cut the very day it is in the thin milk stage. Any later date means a great loss in palatability.

OAT AND PEA HAY.

Oats and pease make a very good hay mixture, but not equal to any of the other hays discussed, save only pure oat hay, which it surpasses for cattle and sheep and at least equals for horses.

MIXED CROP EXPERIMENT.

On West Pine Grove field, which had been under corn in 1903, were grown in 1904, in lots of 1 acre each, 7 different sorts of grain or grain mixtures. The aim was to determine if possible the comparative economy of sowing each sort of grain by itself or mixed with one or more other sorts. This experiment has been carried on for five years now and as the seasons have been quite varied and the soils used have been of different character each year, it may safely be considered as having been a fair test.

The results this year are as follows :—

	Grain, lbs. per acre.
Plot 1, pure pease, yielded	1,135
Plot 2, pure barley, yielded	1,662
Plot 3, pure oats, yielded	1,687
Plot 4, mixture, pease 1 bushel, barley 1 bushel, oats 1 bushel, yielded	1,550
Plot 5, mixture, pease 1 bushel, oats 2 bushels, yielded	1,447
Plot 6, mixture, oats 1½ bushels, barley 1 bushel, yielded	1,689
Plot 7, mixture, wheat ½ bushel, barley ¾ bushel, oats 1 bushel, and pease ¾ bushel yielded	1,493

A summary of the results for the five years is herewith submitted :—

	Pounds of Grain per Acre.					
	1900.	1901.	1902.	1903.	1904.	Five year average per acre.
						Lbs.
Plot 1, pure pease, yielded	1,101	1,140	1,805	1,140	1,135	1,264
Plot 2, pure barley, yielded	1,252	1,070	2,490	1,070	1,662	1,507
Plot 3, pure oats, yielded	2,059	1,819	2,495	1,819	1,687	1,976
Plot 4, mixture, barley 1 bushel, oats 1 bushel, pease 1 bushel, yielded	1,559	.....	2,183	.....	1,550	1,764
Plot 5, mixture, pease 1 bushel, oats 2 bushels, yielded	1,247	746	2,382	.....	1,447	1,455
Plot 6, mixture, oats 1½ bushels, barley 1 bushel, yielded	1,458	1,239	2,360	1,238	1,689	1,597
Plot 7, mixture, wheat ½ bushel, barley ¾ bushel, oats 1 bushel, pease ¾ bushel, yielded	1,560	888	2,225	888	1,498	1,412
Plot 8, mixture, oats and pease equal parts by weight, yielded	1,341	1,052	2,160	1,052	.....	1,401
Plot 9, mixture, oats and pease equal parts by measure, yielded		1,011	2,165	1,011	.....	1,396

The results seem to indicate that, generally speaking, pure grains may be expected to give more pounds to the acre than mixtures.

CORN.

Owing to difficulty in procuring seed of fair germinable quality, it was necessary to sow considerably more large growing late varieties than was desired. Several mixtures were sown, and herewith are submitted a few notes on the pure lots as well as on the mixed lots. Judging by the stand and the weights secured from some small lots cut before the frost of September 23, the yields from the different lots would have been from three to five tons per acre greater than was the actual yield when cut about the end of September and the first week in October.

LEAMING.

Leaming, 14 7/12 acres sown in drills 42 inches apart on June 1, cut for ensilage September 30. It yielded at the rate of 14 tons 610 lbs. per acre. The stand was very good, but frost coming on September 23 and 24 did a great deal of harm. The corn stood from 8 to 11 feet high and was fairly well cobbed.

LONGFELLOW AND RED COB ENSILAGE.

Longfellow and Red Cob Ensilage, 3¼ acres, sown June 8, cut for ensilage, October 6. Growth strong and fairly even, well cobbed in late milk at date of cutting. It stood from 8 to 10 feet high. It was badly frozen, but yielded 11 tons 1,968 lbs. per acre. The two made a very good mixture, which would have made excellent ensilage under favourable conditions.

SOUTHERN MAMMOTH SWEET AND EARLY BUTLER.

Southern Mammoth Sweet and Early Butler, 7 acres, sown June 6, cut for ensilage September 28. It made a strong even growth, but showed very few cobs on either

sort. It got past the late milk stage before being cut, but suffered very severely from the frost. It stood 7 to 9 feet high, and yielded at the rate of 12 tons 30 lbs. per acre.

CUBAN GIANT AND KING OF THE EARLIEST.

Cuban Giant and King of the Earliest, 6 7/12 acres, sown June 8, cut for ensilage October 5. This mixture made a strong, even growth, and was fairly well cobbed in the milk stage at time of cutting. It stood about 9 feet high, was very badly frozen, but yielded 92 tons 995 pounds, or 14 tons 353 pounds per acre. In a good season for corn this mixture would be a most profitable one to sow, particularly so on early or light soil.

NORTH DAKOTA AND RED COB ENSILAGE.

North Dakota and Red Cob Ensilage, 8 7-12 acres, sown June 7, cut for ensilage September 29. Rather uneven in growth, due to character of soil. Few cobs on North Dakota, none on Red Cob. Grew 8 to 10 feet high, and yielded 96 tons 1,355 pounds, or at the rate of 11 tons 527 pounds per acre. This mixture to be a success must have a fairly long season.

A summary of the cost of growing the whole 40 acres is submitted herewith. For particulars of soil preparation, methods of manuring, &c., the reader is referred to the paragraphs discussing the different rotations.

Cost of growing and returns from 40 acres of corn:—

Rent of land at $3 per acre	$120 00
Manure at $3 per acre (same allowance made for all crops)	120 00
Ploughing, 25·2 days at $2.50 per day	63 00
Disc harrowing, 12·6 days at $2.50 per day	31 50
Harrowing, 4 days at $2.50	10 00
Seeding, 4 days at $2.50	10 00
Seed, 20 bushels at $1.20 per bushel	24 00
Hoeing, 80 days at $1.33⅓ per day	106 66
Cultivating, team 32 days at $2.50 per day	80 00
Cultivating, single horse 11·2 days at $1.75 per day	19 60
Cutting with corn harvester, 11·4 days	28 50
Loading, unloading, tramping and putting into silo, 80 days at $1.33⅓ per day	106 66
Drawing with teams, 30·4 days at $2.50 per day	76 00
Twine, 2½ pounds per acre	12 00
Use of machinery at 30 cents per acre	12 00
Use of engine, &c., 6 days at $5	30 00
	$849 92

Forty acres yielded 520 tons 1,690 lbs.
Average yield per acre, 13 tons 42 lbs.
To produce 1 ton ensilage in silo cost $1.63.
Cost to produce 1 acre corn in silo ready to feed, $21.25.

EXPERIMENTAL SILO.

Some years ago a small silo was constructed, to be used for the purpose of experimenting with various crops as material for preservation as ensilage.

Different green crops have been tested from time to time, since its construction, as to their fitness for ensilage manufacture, and reported upon in previous reports.

In September, 1903, the silo was again filled with the following materials and mixtures, beginning at the bottom:—

	Lbs.
1. Pure corn, late milk stage	9,370
2. Corn, late milk stage; Rape cut when about 15 inches high, mixed while going through blower or cut box	5,280
3. Pure corn, late milk stage	5,280
4. Pure rape, cut when about 15 inches high	960
5. Corn, late milk stage; Sunflower heads, mixed going through machine	5,620
6. Horse beans	12,370
	2,120
	1,002
Total weight put in silo	42,002

The silo was emptied in March, 1904, with the following results:—

1. Pure corn, late milk stage (bottom layer), weighed out on March 29, gave an excellent sample of ensilage palatable and sweet. All classes of stock seemed to like it. As noted above, there was put into the silo 9,370 pounds. The amount weighed out was considerably less, being 7,950
   A loss of about 15 per cent.
2. Corn, late milk stage, and rape, mixed in the proportion of 5,280 of corn to 5,280 of rape, removed and fed on March 18, gave a very excellent sample of ensilage that seemed to suit the palates of all classes of horned cattle even better than the pure corn ensilage. While 10,560 pounds of the mixture was weighed in, only 7,680 pounds was taken out, being a loss of about 33 per cent. Removed from silo 7,680
3. Pure corn, late milk stage, came out in condition quite similar to layer 1, and was quite as palatable.
4. Pure Rape, cut as described above, was taken out and fed March 16. It came out in excellent shape, and was eaten with avidity by all classes of cattle. It had a pleasant smell, and a rather pleasing taste. It was not leathery, as any one familiar with rape might have anticipated, but seemed quite as crisp and almost as fresh as when put into the silo. It seemed to be by far the most popular feed that could be given the cattle from among all our succulent feeds, as they would push the corn ensilage and roots away to get at the rape ensilage. The chief objection to be raised is this, that the loss in weight while in the silo is very great. The amount put into the silo was, as already stated, 5,620 pounds, but the amount taken out was only 2,590
5. The corn and sunflower came out in good shape, and as usual made good ensilage. The loss was considerable, but not nearly so great as in the case of rape. There was placed in the silo 14,470 pounds, while the amount removed was 11,500

6. The horse beans were at the top, and were spoiled entirely. The weight of material taken out, however, was. 610

Total weight removed was. 29,330

Percentage loss on pure corn. . . . . 15 per cent of gross weight.
" " corn and rape . . . . 33 " "
" " pure rape. . . . . 54 " "

COMPOSITION.

For a full discussion of the composition and nutritive value of these mixtures, the reader is referred to the report of the Chemist, but a few remarks might not be out of place here.

According to the analysis, the rape on going into the silo showed a dry matter content of 13·95 per cent. of which 1·91 was crude protein. When it came out the dry matter content was found to be 21·81 per cent. of which 2·56 was crude protein. Thus, while the loss is still very considerable, it will be observed that it is not nearly so heavy as might be concluded if the weights alone were considered. When the dry matter content of the rape as it entered the silo is computed it is found to be about 784 pounds, while a calculation shows the dry matter content of the rape ensilage as it came out of the silo to be about 565 pounds, a loss of 219 pounds on 784 pounds, or about 26·5 per cent of loss in the feeding value, as nearly as we may judge of feeding value by the chemical composition.

THE EXPERIMENTAL SILO IN 1904.

The experimental silo has been filled again with the following layers and mixtures:—

1. (Top). Pure corn. 3,195
2. Corn. 5,910
   Alfalfa. 2,050
3. Alfalfa. (This alfalfa was part of the third crop off a field of mixed clovers and grasses.
   A botanical analysis showed about 22 per cent of other clovers and grasses which were of course left in the mixture when it was put in the silo). 4,920
4. Corn. 4,450
   Alfalfa. 5,100
5. Corn. 4,950
   Alfalfa. 2,210
6. Corn (pure). 3,390

Total in silo. 36,175

This silo was filled on October 7, 1904, and will be fed out during the winter.

AUTUMN CULTIVATION.

For several years early shallow plowing has been advocated and practised on the 200 acre farm, where meadow or pasture land was to be put in grain the next year. Two years ago a field of 18 acres was divided into 3 six acre parts.

One part was plowed 4 inches deep in August, and the land cultivated at intervals until late in October, when the surface soil was gathered together into ridges by means of a double mould board plow and put by for the winter.

Another part was torn up with a stiff toothed cultivator and the loosened soil so exposed to the sun was moved at intervals to allow the grass to die. Late in the fall the field, was ploughed and put by for the winter. The other field was not touched till late in the fall, when it was plowed about 6½ or 7 inches deep and left for the winter.

It was impossible to keep track of the returns from each of the parts separately but appearances were much in favour of the early fall plowing and ridging up.

In the fall of 1903 the experiment was repeated and things arranged to permit of a record of the grain crop being secured for each part. Each lot was 5 acres in area.

Lot 1. Ploughed late in the fall 6 inches deep, disc harrowed twice and harrowed once in the spring, sown with seeder · Yielded 8,553 lbs. of oats.

Lot 2. Cultivated 5 times with stiff toothed cultivator, harrowed 5 times and plowed in late autumn about 6 inches deep, was harrowed once in the spring and sown with the seeder. Yielded 9,995 lbs. oats.

Lot 3. Plowed shallow with gang plow in August; cultivated 3 times; harrowed three times, and then the surface soil gathered into ridges for the winter, was cultivated once in the spring, harrowed once and sown with seeder. Yielded 10,845 lbs. oats.

The three lots were each seeded with clover. Lot 1 was a poor catch; lot 2, a fair catch, and lot 3, a very excellent catch.

It is to be regretted that lot 3 cannot be left in hay in 1905. Lots 1 and 2 will be in hay, however, and will be watched with interest. The experiment is being repeated.

REPORT OF THE HORTICULTURIST.

(W. T. Macoun.)

December 1, 1904.

Dr. Wm. Saunders,
Director, Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit herewith the eighteenth annual report of this division.

In the following pages will be found the results of some of the most important experiments conducted during the past year, and information regarding other work done.

CHARACTER OF SEASON.

The winter of 1903-4 was the most severe winter that has been experienced in Ottawa for many years, and the past summer has been one of the coolest summers. The frost last winter played great havoc in the orchards of Ontario and Quebec, many fruit trees being killed which had never been previously injured, and in the Essex district the peach trees were nearly all destroyed.

Winter set in on November 16, 1903, and there was sufficient snow for sleighing by November 24, and on the 26th of that month the temperature fell to zero. December, January and February were all very cold months, the temperature only rising above the freezing point three times in December and twice in February, and then only for a short time, there being no real thaw. In January it never thawed. During the winter the temperature fell below zero 58 times, and lower than 20° F. below zero 15 times. In the coldest spell, which lasted from December 26 to January 6, the minimum temperature ranged from 4 to 30 degrees F. below zero for twelve consecutive days, and on 6 of the 12 days it was between 20° and 30° F. below zero. The lowest temperature recorded during the winter was 30·2° F. below zero on January 5. This continuous, dry, cold weather was very hard on fruit trees and a large number were killed. Fortunately, there was a good covering of snow all winter and little, if any frost in the ground, so that vegetation below the snow line was practically uninjured. The snow was at its greatest depth on March 21st., when there were about four feet on the level. There was a thaw on March 22, and by April 1, sleighing was practically gone. By April 11, the snow was out of the orchards and the soil in most of the apple and plum orchards was in condition for ploughing at once. The indications were that the injury from mice would have been great if the trees had not been protected, as a few seedling trees not protected were badly injured. April was a very cool month, with much cloudy weather, the highest temperature recorded being 66° F. on the 24th. On the 20th, there was a heavy fall of snow and good sleighing for cutters. The early part of May was quite warm and owing to the rapid development of the leaves the planting season was much shorter than usual, but it was a fine month for sowing seeds. The highest temperature in May was on the 9th., when the thermometer registered 85° F. There were no frosts in May, and in fact none since April 23. June was a much cooler month than usual. The highest temperature was on the 25th, when it was 87·5° F. There was one warm week in July, but the month on the whole was cool and cloudy, and especially cool at nights. The highest temperature during the month was 95° F. on

the 19th. This was the only day during the summer when it rose to 90 or above. August was also cooler than the average, and while there were a few warm days the temperature did not rise very high, 83·5° F. being the highest reached, on the 5th. The summer was not a favourable one for the ripening of tender vegetables, such as melons and tomatoes, nor for other plants which require warm weather. September was another cool, cloudy month with much rain and not favourable for the ripening of grapes, of which there was a large crop, but of which few kinds matured. There was a severe frost on the night of September 21-22, the temperature falling to 27·5° F. and practically everything tender was killed, including tomatoes, melons, corn, cucumbers, beans and grape leaves. Up to this time, although there had been local white frosts, not registered at the Experimental Farm, there had been no frost recorded and no injury from frost since April 23. October was a very cool month with only about one week of fine, pleasant weather. Severe frosts were frequent, the temperature falling to 19° F. on the 31st, and from the 29th on the frost did not leave the ground, as during the early part of November the weather, though fine, was cold. The frosts were so severe during the second week of November that ploughing was stopped, but most of the frost came out again. Winter set in on November 24, with snow and frost in the ground.

FRUIT AND VEGETABLE CROPS.

In the provinces of Ontario and Quebec the apple crop, although an average one in some places, was not quite as large as in 1903, and below the average on the whole, nor was the fruit as good in quality, being smaller and more spotted in most districts. The crop of pears was good, but peaches and plums were light crops. Owing to the very cool summer and autumn, grapes did not ripen as soon nor as well as usual, but there was a good crop in most places, although the black rot was very destructive in some cases. There was a light crop of strawberries in western Ontario owing to winter-killing of the plants, but in eastern Ontario and the province of Quebec the crop, although lighter than usual, was not much below the average. The raspberry crop was good.

The fruit crop at the Central Experimental Farm was, on the whole, a good one. There was a large crop of apples, the fruit being clean and of good size. There was a fine crop of Americana and Native plums, and the fruit was larger than usual. The strawberry crop, although not as large as in some other seasons, was not much below the average; while currants, raspberries and gooseberries all bore well. There was never a better crop of grapes here, but owing to the cool autumn comparatively few kinds ripened thoroughly.

Some kinds of vegetables were not very satisfactory this year owing to the cool weather, the crop of tomatoes being light, and melons almost a total failure except where forced. The yields from the experimental plots of potatoes averaged well.

MEETINGS ATTENDED, PLACES VISITED AND ADDRESSES DELIVERED DURING THE YEAR.

Annual meeting, Quebec Pomological Society, Hemmingford, December 17-18, 1903. Address: 'Why Fruit Trees Die or Fail to Produce Fruit.'

Annual meeting, Nova Scotia Fruit Growers' Association, Bridgewater, N.S., January 27-28, 1904. Address: 'Causes of Failure in Beginning Fruit Growing.'

Farmers' Institute Meeting, Orillia, Ont., January, 11-12, 1904. Address: 'Orchard Management and Work of the Dominion Experimental Farms.'

International meeting, Port Huron, Mich., U.S., March 3-4, 1904. Address: 'Hardy Fruits for Cold Climates.'

Hamilton Horticultural Society, Hamilton, Ont., March 24, 1904. Address: 'Hardy Climbers, with Notes on some of the Newer Annuals and Perennials.'

Guelph Horticultural Society, Guelph, Ont., March 25, 1904. Address: 'Hardy Climbers for the Home Grounds.'

Canadian Florists' Association, Ottawa, Ont., August 9-10-11. Address: 'Hardy Perennials Suitable for Florists.'

Orchard meetings, at Cumberland, Hazeldean and City View, Ont., August 15-16-17, 1904. Address: 'Demonstrations in Orchard Management.'

Summer meeting, Quebec Pomological Society, St. Jerome, Que., August 24-25, 1904. Address: 'Hints to Beginners in Fruit Culture.'

St. Catharines Horticultural Society, St. Catharines, Ont., September 12, 1904, 'Work of the Horticultural Society.'

Annual meeting, Ontario Fruit Growers' Association, Toronto, Ont., November 15-19, 1904, 'Hardy Climbing Plants,' 'Report on New Fruits,' 'Discussion on Grape Rots.'

The following places were also visited during the year for the purpose of obtaining information which would be of service in furthering the fruit-growing interests of Canada. Returning from the summer meeting of the Quebec Pomological Society, I drove through the fruit districts of Dundas county, Ontario, visiting particularly the orchards of A. D. Harkness and Dr. Harkness, Irena, Ont., and Allan McIntosh, Dundela, Ont. Here were seen the oldest McIntosh Red apple trees in existence, including the original McIntosh Red tree itself, which is now almost dead. At Irena, Dundela and vicinity there are orchards of McIntosh Red apples producing from 100 to 200 barrels of this delicious variety. On September 4 and 5 I visited the Toronto Exhibition, and in studying the collections of fruit there, added considerably to my knowledge of varieties. On the occasion of my attendance at the meeting of the St. Catharines Horticultural Society, I took the opportunity of visiting a number of vineyards at St. Catharines and Winona in order to study the diseases of the grape which are causing much loss in the vineyards there, the Black Rot especially being very destructive. From October 17 to 22, I visited the World's Fair at St. Louis and made a careful comparison of the fruit exhibits form the various States and Canada, and had a particularly good opportunity of examining the different collections, as for two days I acted as a temporary judge. While at St. Louis I took the opportunity of visiting the Missouri Botanical Gardens, and in comparing the gardens there with our own, and examining the specimens was able to carry away impressions which may be put to good use. On my way home I visited the orchards of W. H. Dempsey, Trenton, Ont., and others in that district and studied the methods of picking, packing and storing apples employed in this fine apple district. While here I was able to obtain some good fruit for the Canadian exhibit at the World's Fair.

ACKNOWLEDGMENTS.

I can but repeat this year the expression of appreciation made in past years of the work done in my department by Mr. J. F. Watson and Mr. H. Holz. The efficient manner in which the work they had to do has been accomplished is both gratifying to myself, and, I believe, a credit to the department. I also again wish to thank all those persons both in Canada and the United States who have, by the information so kindly furnished and by the plants, scions and seeds donated, and in other ways, aided me in trying to promote the horticultural interests of Canada.

DONATIONS.

There has been a large number of donations again this year which are gratefully acknowledged herewith. Some of the most valuable and interesting things which have been tested by the horticultural division are received in this way :—

Sender.	Donation.
Arnold Arboretum, Jamaica Plain, Mass.	100 species Crataegus and other plants.
D. F. Aikin, Farmington, Minn.	Scions, seedling apple.
H. Beyer, New London, Iowa.	6 plants Everbearing raspberry.
Botanic Garden, Upsala, Sweden.	Collection of seeds.
R. Brodie, Westmount, Q.	Scions, Ogilvie apple.
Botanic Garden, Lausanne, Switzerland.	66 packages of seeds.
Botanic Garden, Karlsruhe, Baden.	58 packages of seeds.
Thos. Connolly, Lindsay, O.	Scions, seedling apple.
Wm. Craig, Abbotsford, Q.	Scions, Victoria apple.
Mr. L. Cameron, Iroquois, O.	Buds of seedless apple.
J. K. Darling, Almonte, O.	Scions, unknown apple.
B. Edwards, Covey Hill, Q.	Apple scions.
Geo. Fraser, Ucluelet, B.C.	Plants of "Pyrus rivularis."
H. N. Grant, Newtonbrook, O.	Scions, seedling apple.
A. Harkness, Lancaster, O.	Scions, unknown apple.
Robert Hamilton, Grenville, Q.	Scions, seedling apple.
A. D. Harkness, Irena, Ont.	Scions, seedless apple.
C. P. Hanon, Mount St. Hilaire, Q.	Scions of red apple.
N. E. Jack, Chateauguay Basin, Q.	Queen Mary plum scions.
Daniel, Lack, Lindsay, Ont.	Scions, seedling apple.
J. S. Littooy, Everett, Wash.	6 plants Superlative raspberry.
Prof. J. Macoun, Ottawa, Ont.	Bulbs of "Erythronium grandiflorum."
E. Morris, Fonthill, Ont.	Scions, McDonald apple.
Prof. J. Macoun, Ottawa, Ont.	Evergreens from Rocky Mountains.
D. C. McKinnon, Atherley, O.	Scions, seedling apple.
Geo. H. McMillan, Dunbar, O.	1 case of Bug Death.
New York Experiment Station, Geneva, N.Y.	Scions, seedling apple.
C. P. Newman, Lachine Locks, Q.	Grape cuttings.
A. W. Peart, Leamington, O.	Scions, seedling apple like McIntosh also Williams' Favorite.
E. M. Richardson, Toronto, O.	Scions, unknown apple.
Heber Rawlings, Forest, O.	Ash Leaf Kidney potato.
Royal Gardens, Kew, England.	Collection of seeds.
Royal Botanic Gardens, St. Petersburg, Russia.	Packages of seeds.
N. Smith & Son, Adrian, Mich.	6 plants "Helianthus sparsifolia."
C. H. Snow, Cumming's Bridge, O.	Scions, Red Sports of St. Lawrence apple.
C. L. Stephens, Orillia, Ont.	Scions, hardy peach and Red Russet apple.
F. G. Semple, Brule, N.S.	Scions, unknown apple.
Stark Bros., Lousiana, Mo.	Scions, E. 5, Z. 26, Bay and Black Ben Davis apples.
C. L. Stephens, Orillia, O.	Scions, apples and plums.
Wm. Stark, Kelso, Scotland.	Northern Star potato.
A. E. Sherrington, Walkerton, O.	Scions, Sweet Bough and Northern Spy apples.
Robert Thompson, St. Catharines, Ont.	Scions, unknown apple.
Prof. F. A. Waugh, Amherst, Mass.	Plants of "Prunus Besseyi."
H. E. Wright, Summerside, P.E.I.	Scions, Abegweit plum.
C. W. Young, St. Stephen, N.B.	2 Dickey Bug Death Dusters.

I have the honour to be, sir,
Your obedient servant,

W. T. MACOUN,
Horticulturist.

APPLES.

The winter of 1903-4 was the severest in the history of the Central Experimental Farm and the coldest on record in this district. In the orchards at the farm, 306 apple trees were killed, including 164 varieties. Owing to the good covering of snow there was no root killing, many trees being merely killed to the snow line, this point being

clearly marked on the trunk in most cases. The vacancies caused by the death of the trees were most of them filled by varieties not hitherto tested, and by those which had proven hardy and were desired in larger numbers.

APPLE CROP.

Notwithstanding the severe winter, the apple crop was good at the farm this year and the fruit was clean, being without spot and exceptionally free from Codling Moth.

SEEDLING AND CROSS-BRED APPLES.

This year 192 seedlings of good varieties were added to those planted during the past four years, making the total number of apple seedlings of good varieties 1,788. Some work in cross-breeding apples was also accomplished, and the seeds obtained were sown this autumn. Some of the trees of the crosses between McIntosh Red and Lawver are approaching fruiting age and some good varieties are hoped for from these, as well as from the seedlings. This year 17 different crosses between McMahon White and Scott's Winter fruited, but although most of these resembled either or both parents in some respects, it is doubtful if any of them will be superior. There are three resembling Scott's Winter, but larger, which possibly may be useful.

EFFECTS OF WINTER KILLING ON TOP GRAFTED TREES.

During the past six years, 90 varieties of apples have been top grafted on hardy stocks with the object of determining whether varieties which would not succeed when grown in the ordinary way would prove satisfactory when top grafted on stocks having hardy trunks. The experiment was proving very interesting and some varieties were apparently going to succeed when tested in this way, but last winter came and killed practically all those which had proven tender when tried as standard trees. Anyone who thinks that hardy stocks will make the graft noticeably hardier will have abundant proof that such is not the case from the following table. The dividing line between graft and stock was very marked in all cases examined. A Northern Spy, which had been top grafted on Duchess for 13 years, was killed completely back to the stock, which was as healthy as ever; and many other instances might be quoted. Two varieties of apples were top grafted on Wealthy in 1891. One of these, the Milwaukee, a hardy variety, and another, the Martha. Each variety occupied about half the top of the tree. The Martha was all killed, while the Milwaukee remained alive and bore a good crop of fruit. Top grafting will bring a tree into bearing sooner and will permit of growing varieties which sunscald on the trunk or are weak in the trunk in other respects, but the grafts if made any hardier are not sufficiently so to stand very severe winters.

In the following table will be found the names of the varieties of apples, 164 in number, which were killed last winter with the earliest dates of planting or top grafting the trees killed. Other varieties had been killed previous to last winter which are not recorded in this table, the Ben Davis being one of these. There were a few varieties of which one or more trees were killed, but others left uninjured, which are not included in the table, as they had proven so hardy up to last winter in this district. Among these may be mentioned American Golden Russet, Pewaukee, Baxter, and Canada Red, which are hardy enough to be given a further trial:—

VARIETIES of Apples Winter-killed, 1903-1904.

Name.	Number of Standard or Top-grafted Trees, Winter-killed, 1903-1904.	First Dates of Planting or Top-grafting
Allen's Choice	2 st.	pl. 1897.
Allington Pippin	1 st.	pl. 1899.
Almond Reinette	1 st.	pl. 1895.
Arctic	1 st., 4 t. gr.	pl.'98, t.g.'97
Arkansas Black	2 st.	pl. 1896.
Aport (White Alexander)	1 st.	pl. 1897.
Aurora	1 t. gr.	t. gr., 1900.
Baldwin	1 st., 2 t. gr.	pl.'00, t.g.'99
Bayard Williams	1 st.	pl. 1899.
Belle de Boskoop	1 st., 1 t. gr.	pl.'00, t.g.'98
Bedfordshire Foundling	1 st.	pl. 1899.
Black Annette	1 st.	pl. 1899.
Blenheim Pippin	2 st., 1 t. gr.	pl.'97, t.g.'03
Bohemian Favorite	1 st.	pl. 1903.
Boiken	4 st.	pl. 1892.
Boy's Delight	3 st., 1 t. gr.	pl.'97, t.g.'01
Bottle Greening	1 st.	pl. 1900.
Bramley's Seedling	2 st.	pl. 1902.
Burlovka	2 st.	pl. 1888.
Carliss Red	1 t. gr.	t. gr., 1900.
Carthouse	1 st.	pl. 1903
Chenango Strawberry	1 st.	pl. 1900.
Chelibi	1 st.	pl. 1896.
Cooper's Market	1 st.	pl. 1900.
Colvert	1 st.	pl. 1903.
Cox's Orange Pippin	2 t. gr.	t. gr., 1903.
Delicious	1 st.	pl. 1901.
Dempsey No. 80	1 st.	pl. 1895.
Devonshire Quarrenden	1 st.	pl. 1899.
Dr. Noyes	1 st.	pl. 1903.
Dr. Walker	2 st.	pl. 1891.
Domine	1 st.	pl. 1901.
Duffey's Seedling	1 t. gr.	t. gr., 1901.
Ecklinville Seedling	1 st.	pl. 1902.
Edgehill	2 st.	pl. 1893.
Eisike	2 st.	pl. 1895.
Empress	1 st.	pl. 1899.
English Pippin	1 t. gr.	t. gr., 1896.
Esopus Spitzenburg	1 st., 2 t. gr.	pl.'00, t.g.'02
Fall Jenetting	3 t. gr.	t. gr., 1900.
Fall Pippin	1 st.	pl. 1900.
Fallawater	2 st., 2 t. gr.	pl.'00, t.g.'98
Fameuse Noire	3 st.	pl. 1893.
Fillipa's Apfel	1 st.	pl. 1899.
Flat Aport	1 st.	pl. 1901.
Flushing Spitzenburg	2 st., 1 t. gr.	pl.'02, t.g.'03
Forest No. 3	1 st.	pl. 1901.
Forest No. 4	1 st	pl. 1901.
Gascoigne's Seedling	1 st.	pl. 1901.
Gano	4 st.	pl. 1901.
Ghent T.	2 st., 1 t. gr.	pl.'95, t.g.'03
Gideon No. 20	1 st.	pl. 1902.
Graham, I. J., from	1 st.	pl. 1901.
Golden Stone	1 t. gr.	t. gr., 1891.
Goode	1 st.	pl. 1900.
Gravenstein	1 t. gr.	t. gr., 1903.
Greenfield Seedling	1 st.	pl. 1899.
Grimes' Golden	2 t. gr.	t. gr., 1903.
Hebble	1 st.	pl. 1901.
Henzen's Gravenstein	1 st.	pl. 1899.
Hofgärtner Braun	1 st.	pl. 1899.
Holly	1 st.	pl. 1901.
Hoover's Seedling	1 st.	pl. 1898.
Hoover's Red Seedling	1 st.	pl. 1897.
Hubbardston	1 t. gr.	t. gr., 1903.
Huntsman	1 st	pl. 1891.
Hurlbut	1 t. gr	t. gr., 1901.
Hybrid No. 37 (Iowa)	1 st.	pl. 1897.
Jacob's Sweet	1 st.	pl. 1900.
Johnston, Asa, No. 2, from	1 st.	pl. 1902.
Johnston, Asa, No. 7, from	1 st.	pl. 1901.
Kara Synap	2 st., 1 t. gr.	pl.'96, t.g.'91
Keswick Codlin	1 st., 1 t. gr.	pl.'00, t.g.'98
Kinkead	2 st.	pl. 1902.
King	1 t. gr.	t. gr., 1901.
Knight's Greening	1 st.	pl. 1901.
Knight's No. 2	1 st.	pl. 1899.
La Victoire	1 st.	pl. 1902.
Lady	1 st.	pl. 1888.
Lady Sudeley	1 st.	pl. 1899.
Lady Washington	1 st.	pl. 1897.
Lake's Pippin	1 st.	pl. 1896.
Lanark Greening	1 st.	pl. 1902.
Lamb Abbey Pearmain	1 st.	pl. 1902.
Lane's Prince Albert	2 st.	pl. 1899.
Lawver	6 st., 1 t. gr.	pl.'99, t.g.'99
Leaf, W. H., from	1 st.	pl. 1897.
Legal Tender	1 st.	pl. 1901.
Lord's Late	1 t. gr.	t. gr., 1899.
Louise	2 st.	pl. 1893.
Mann	3 st.	pl. 1890.
Marsh, J. D., from	1 st.	pl. 1901.
Martha (not crab)	1 t. gr.	t. gr., 1891.
Messenger, R., from	1 t. gr.	t. gr., 1903.
Merrit	1 st.	pl. 1901.
Milding	2 st.	pl. 1897.
Minkler	1 st.	pl. 1893.
Missouri Pippin	3 st., 1 t. gr.	pl.'99, t.g.'02
Mitchell's No. 5	2 st.	pl 1896.
Mother	1 t. gr.	t. gr., 1900.
McCallum No. 102	1 st.	pl. 1899.
McLure Pippin	1 t. gr.	t. gr., 1901.
New Winter H'wthornd'n	1 st	pl. 1900.
Newell's Winter	1 t. gr	t. gr., 1903.
Nodhead	2 st., 1 t. gr.	pl.'99, t.g.'03
Northern Spy	1 st., 2 t. gr.	pl.'99, t.g.'91
Ontario	3 t. gr.	t. gr., 1899.
Peasegood Nonsach	1 st.	pl. 1899.
Perry's Russet	1 st.	pl. 1900.
Pomme Grise	1 st.	pl. 1888.
Primate	2 t. gr.	t. gr., 1900.
Princess Louise	1 st.	pl. 1899.
" of Denmark	1 st.	pl. 1899.
Ramsay, A. J., No. 2, from	1 st.	pl. 1898.
Red Detroit	2 st.	pl. 1901.
Red Subluck	2 st.	pl. 1895.
R. I. Greening	1 st., 1 t. gr.	pl.'00, t.g.'03
Ribston Pippin	3 st., 1 t. gr.	pl.'00, t.g.'03
Rockwood	1 t. gr.	t. gr., 1902.
Rome Beauty	1 t. gr	t. gr., 1902.
Rubicon	2 st.	pl. 1895.
Ruby Gem	3 st.	pl. 1893.
St. Johnsbury	1 st.	pl. 1899.
Salome	3 st.	pl. 1883.
Sambo	2 st.	pl. 1895.
Saxton	1 st.	pl. 1899.
Senecal	1 st.	pl. 1899.
Shackleford	2 st.	pl. 1899.

VARIETIES of Apples Winter-killed, 1903-1904—*Concluded.*

Name.	Number of Standard or Top-grafted Trees, Winter-killed, 1903-1904.	First Dates of Planting or Top-grafting	Name.	Number of Standard or Top-grafted Trees, Winter-killed, 1903-1902.	First Dates of Planting or Top-grafting
Shannon	1 st.	pl. 1900.	Vermont Sweet	2 st.	pl. 1899.
Sklianka	2 st.	pl. 1888.	Wagener	2 t. gr.	t. gr., 1902.
Smith's Cider	1 st.	pl. 1902.	Walworth Pippin	1 st.	pl. 1895.
Spencer	2 st., 1 t. gr.	pl. '91, t.g. '02	Warner's King	1 st.	pl. 1892.
Springdale	1 st.	pl. 1897	Washington Royal	1 t. gr.	t. gr., 1903.
Starr	2 st.	pl. 1899.	Westfield Seek No Further	1 st., 1 t. gr.	pl. '90, t.g. '01
Stark	3 st., 2 t. gr.	pl. '01, t.g. '03	Willow Twig	1 st.	pl. 1903.
Stettin No. 80	1 st.	pl. 1896.	Windsor Chief	1 st.	pl. 1895.
Stuart's Golden	1 t. gr	t. gr., 1903.	Winesap	2 st.	pl. 1900.
Sturmer Pippin	1 st.	pl. 1902.	Winter Banana	1 t. gr.	t. gr., 1903.
Sugar Sweet	1 st.	pl. 1893.	Winter Bough	2 st.	pl. 1889.
Sutton Beauty	1 t. gr	t. gr., 1902.	Winter Duchess	1 st.	pl. 1889.
Summer King	1 st.	pl. 1903.	Winter Calville	1 st.	pl. 1899.
Svintzovka	1 st.	pl. 1892.	Winter Maiden's Blush	3 st.	pl. 1899.
Swaar	1 st.	pl. 1900.	Winter Rambour	1 st.	pl. 1895.
The Jake	1 st.	pl. 1896.	Yellow Bellflower	2 t. gr.	t. gr., 1901.
The Queen	4 st.	pl. 1901.	York Imperial	1 t. gr.	t. gr., 1901.
Tom Putt	1 st.	pl. 1902.			
Trdika	1 st.	pl. 1899.			

REVISED LIST of varieties of apples recommended for the province of Ontario between latitudes 45° and 46° and along the north side of the St. Lawrence river in the province of Quebec to about Three Rivers (District No. 7, Bulletin 37.)

Owing to the winter killing of some varieties of apples last winter, which were previously thought to be hardy, it is necessary to revise the list of apples recommended for this district. The only important changes which occur, however, are in the winter varieties.

Summer.—Yellow Transparent, Duchess of Oldenburg.

Autumn.—St. Lawrence, Wealthy, Alexander.

Early Winter.—McIntosh Red, Fameuse.

Winter.—Scott's Winter, Milwaukee, North Western Greening, Canada Baldwin, and Golden Russet in the more favoured localities.

Additional varieties suggested for home use:—

Summer.—Lowland Raspberry, Early Joe, Russell, Dyer.

Winter.—Swayzie Pomme Grise, Grimes Golden.

A CLOSE-PLANTED WEALTHY ORCHARD.

In the Annual Report for 1902, an account was given of a close-planted orchard of Wealthy apple trees. The receipts and expenses in connection with this orchard, from the time the trees were planted until the autumn of 1902, were published in that report. It was shown that from a little less than one-third of an acre of trees planted 10 by 10 feet apart in the spring of 1896 the receipts had been $307.01, or at the rate of $940.15 per acre, and the expenses per acre $454.62, leaving the net receipts per acre $485.53. The trees began bearing well in 1899 and the receipts represent the money obtained for the fruit for four years' crops. These net receipts meant an average per year of fruiting of $121.38 per acre. There are 131 trees in this orchard left out of an original number of 144.

The crop in 1903 was a light one, being 161 gallons picked fruit, and 162 gallons windfalls, or a total crop of about 13½ barrels, but this year it was very good, and while the fruit was smaller it was highly coloured, and sold as well as could be expected on such a glutted market as there was this year.

In the following table will be found the receipts and expenditure from the year 1899, when the trees began to bear well, until the autumn of 1904. The expenses before 1899, including rent of land, cost of trees, planting and cultivating are estimated at $150 per acre.

Receipts.		Estimated per acre.
1899-1902	$ 307 01	$ 940 15*
1903, sold 88 baskets at 17½ cts	20 80	62 92
1904 " 60 boxes (Dublin) 4s. 6d. ($1.09)	65 40	197 83
" 30 boxes 3s. 6d. (85cts)	25 50	77 14
" 20 boxes (Glasgow) 5s. ($1.22)	36 60	110 71
" 46 baskets at 20cts	9 20	27 83
" 42 baskets at 17½ cts	7 35	22 23
" 53 bags (X grade) 30cts	15 90	48 10
Total receipts, 1899-1904	$ 487 76	$1,486 91

Expenses.

	Estimated per acre.
1896-1899—Estimated expenses per acre including rent of land, cost of trees, planting and cultivating	$ 150 00
1899-1902 (For details see report for 1902). Total expenses per acre	454 62
1903, Rent of land	3 00
Spraying	9 44
Cost of baskets (baskets at 5½ cts. each)	14 64
Cost of picking	8 05
Cost of packing	5 32
Commission on sales	6 29
1904, Rent of land	3 00
Spraying	9 44
Cost of boxes and baskets (boxes at 14½ cts., baskets 6¼ cts)	69 27
Cost of picking	60 50
Cost of packing and grading fruit in boxes, including excelsior and cardboard	69 01
Cost of packing baskets	5 32
Freight, &c., on boxes of fruit sold	115 24
Commission on fruit sold in boxes	11 62
Commission on fruit sold in baskets	4 99
Total expenses, 1896-1904	$ 999 75
Total receipts per acre, 1896-1904	$1,486 91
Total expenses per acre, 1896-1904	999 75
Net receipts	$ 487 16
Average profit per acre per year, 1896-1904	$ 54 13
Average profit per acre per year, 1899-1904	106 19

*Part of this estimate of $940.15 is based on the yields from 139 trees and part from 144. Five trees died previous to 1899 and were not replaced, hence it was considered fairer to estimate from those that remained. In 1902 and since, however, the yields have been estimated on the area occupied by the original plantation of 144 trees, as this area now is fully occupied by the trees.

By Frank T. Shutt.

Wealthy Apple Orchard (close planted) in Bloom.

By Frank T. Shutt.)

Apple Tree top grafted with Two Varieties.

(One variety winter killed, other uninjured and requiring props to support load of fruit.)
Horse Bean cover crop shown in the foreground.

These expenses are estimated from about one-third of an acre and on the assumption that the percentage of sales in boxes and bsakets would be the same from a full acre. There was no expense for cultivating either in 1903 or 1904, as the trees being close, cultivation was impracticable. There was no expenditure on barn-yard manure or chemical fertilizers in 1903 or 1904, as none were applied up to the time of making these calculations.

While this system of close planting is not recommended for general adoption, it is well worthy of a trial by fruit specialists who will give sufficient attention to it. Only a few varieties of apples are suitable for close planting, Wealthy being one of the best, and Wagener probably almost as good, on account of their early bearing habit. The Wealthy orchard at the Central Experimental Farm will receive a good dressing of barnyard manure this winter. As the trees are now meeting and it would be unwise to continue to grow them as thick any longer, an experiment will be tried next spring of heading back a proportion of the trees severely, the object being to re-head the trees alternatively, thus keeping up the vigour and allowing light to get at the fruit. If this is not found satisfactory some of the trees will be removed altogether. The total crop this year on about one-third of an acre was 2,134 gallons, about 90 barrels, or at the rate of about 270 barrels to the acre. Thtere were 564 gallons windfalls and 1,570 gallons picked fruit. There are still 131 trees of the original 144 alive, most of them in a thrifty condition.

EXPERIMENTAL APPLE SHIPMENTS TO IRELAND AND SCOTLAND IN 1904.

In 1902 and 1903 experimental shipments of apples in boxes were made to Glasgow, Scotland, with gratifying results, both in regard to the condition in which the fruit arrived on the other side and in the prices obtained for it. The information furnished in the annual report regarding sales and cost of shipment proved very acceptable to growers in Canada who had not had any experience in shipping apples and who did not know how to go about it.

As agents in Ireland had been requesting Canadian fruit growers to give the Irish market a trial this year, it was thought that useful information would be obtained by making some experimental shipments there. This was considered particularly desirable this year when there was such a large crop of apples in England and it was thought the Irish market would not be as well supplied with home-grown fruit, and better prices would therefore be obtained. The crop in Ireland, however, was a very large one also, and the prices obtained for summer and autumn apples from Canada was low, in some cases not covering the cost of shipment.

Six shipments in all were made, four being to Belfast, Ireland, one to Dublin, Ireland, and one in Glasgow, Scotland, for comparison. All the apples were packed in boxes 10 x 11 x 20 inches, inside measurement. The fruit was placed in regular rows and tiers in the boxes with a sheet of cardboard above and below and a very little excelsior between the cardboard and the sides of the box. The Charlamoff apples in the second shipment were wrapped in tissue paper, and the Anis and Winter Stripe in the third shipment, the others were not wrapped. As a rule the apples were well coloured but still hard, with the exception of the Duchess apples in the first shipment, which were not as well coloured as in the second, being picked earlier. The fruit was inspected by the Dominion fruit inspectors at Montreal and all graded XXX.

Following is a table showing the prices obtained for the different varieties, the date and steamer on which they were shipped; name of variety, number of boxes, selling price per box, destination and route, and whether sent in cold storage or not. It will be seen from the table below that fair profits for the season were had from the Dublin and Glasgow shipments. The fruit sent to Belfast realized considerably less. The charges on these are not yet available, but it is expected the returns will not do much more than cover expenses.

Date of Shipment.	Destination and Route.	Name of Steamer.	Name of Variety.	Number of Boxes.	Selling Price, per box.	Cost of Shipment, including cost of boxes, packing, material, freight, commission, &c.	Profit.
1904.					s. d.	$ cts.	$ cts.
Aug. 20	Belfast *via* Liverpool (cold storage)	Dominion.....	Duchess.....	100	2 0	.....	
" 27	" " " ..	Vancouver.....	"	55	2 0	.....	
" 27	" " " ..	"	Charlamoff (Pointed Pipka)	70	3 6	.....	
Sept. 14	Belfast (direct).....	Bray Head.....	Antonovka	46	1 6	.....	
" 14	" "	"	Anis.....	24	2 6	.....	
" 14	" "	"	Dudley.....	12	2 6	.....	
" 14	" "	"	Winter Stripe..	12	2 6	.....	
" 14	" "	"	McMahon White..	6	2 6	.....	
" 18	Dublin (direct).....	Inishowen Head	Wealthy.....	70	4 6	66 79	35 48
" 18	" "	"	"	30	3 6		
" 29	Glasgow (direct)	Parthenia. ...	"	30	5 0	31 28	12 55
" 29	" "	"	Patten's Greening..	10	3 0		
" 30	Belfast (direct).....	Dunmore Head..	Wealthy.....	20	3 0	.....	
" 30	" "	"	McMahon White..	5	3 0	.....	

The following quotations from letters received from the consignees show the condition in which the fruit arrived, and give the criticisms made upon it. These are published for the guidance of fruit growers in the future. It is very satisfactory to know that no complaints were made with regard to the packing of the fruit nor of the condition in which it arrived.

REPORT OF FIRST SHIPMENT OF DUCHESS APPLES IN COLD STORAGE TO BELFAST, IRELAND.

'BELFAST, September 7, 1904.

'I have received the 100 boxes of Duchess apples this week, and the quality of the apples is rather disappointing, as it is not good enough for eating, and for cooking, buyers prefer our own Irish apples which are an exceptionally good crop this year and very cheap. Had they been a nice good keeping eating apple and a good colour, I could have sold them, I think, very well. They are certainly very well put up and the packing very good, in fact, one of the largest buyers told me he would take the whole of the apples if they had been suitable, but he would not take a box when he saw them. He said he was quite prepared to pay me 4d. for as many of the empty boxes as I could get him, but the apples to him were useless, as they would not suit his customers at all. What we want is a nice dessert apple. We have plenty of the cooking grade here. There was only one buyer that would make me an offer at all, and the best he would make me was 2s. per box ex quay.'

(Signed) 'HUGH GORDON.'

EXTRACT FROM REPORT OF SECOND SHIPMENT (DUCHESS AND CHARLAMOFF).

BELFAST, September 14, 1904.

'The second consignment of apples has arrived, and as requested, I have examined the boxes and notice the way you have them packed. They are certainly very well put up, but some of the largest fruit merchants here state that they are the wrong kind of apples (they were Duchess and Charlamoff) you are shipping, as they will

keep no time and would have to be disposed of immediately they arrive, and as there is considerable risk to the buyer, he will not be willing to give a very big price for them, as the Irish apples are so plentiful this year and are being sold at very low prices. One of the largest fruit merchants in Belfast informed me that if you could get him any barrels of Alexander apples that he would have a ready sale for them, in fact, he said that the demand was entirely on barreled apples as the boxes were difficult to place, as there is so very little bulk, and of course the prices must be higher in consequence of the expense of packing. Have only been able to get 3s. 6d. for Pipkas (Charlamoff) and 2s. for Duchess ex quay Belfast.'

(Signed) 'HUGH GORDON.'

EXTRACT FROM REPORT OF THIRD SHIPMENT (ANTONOVKA, WINTER STRIPE, ANIS, DUDLEY).

'BELFAST, October 27, 1904.

'*Re* 100 boxes of apples, they came in good order, but as I have already wrote you, you are not shipping the right sort of apple at all. What we want is a good eating apple somewhat similar to good Baldwins and packed in barrels. Apples are so very cheap here that it is impossible to get a decent price for them, and I don't know what you think of the grade you are shipping, but buyers do not care for them at all, the flavour not being nice like Baldwins. I sold 46 boxes at 1s. 6d. per box. Winter Stripe, Anis, Dudley and McMahon White, I sold at 2s. 6d. per box, less the freight, so that after deducting the freight I have practically nothing left for the apples. As you are aware, this is a very bad year for experimenting with apples, and I believe that apples in barrels would do a great deal better than in boxes as they would come cheaper.'

(Signed) HUGH GORDON.

EXTRACT FROM REPORT OF FOURTH SHIPMENT (WEALTHY).

DUBLIN, October 19, 1904.

'I duly received the consignment of 100 boxes, Wealthies per SS. *Innishown Head*. They arrived in very good condition, presenting a fine appearance when opened. The only thing I noticed in respect to the boxes was that a few of them had the end pieces broken across, but this did not cause any damage to the contents. The trip occupied twelve days and it was four days after the steamer arrived here before I got delivery, thus making sixteen days from the time of shipment, and considering that the consignment did not come in cold storage, the result was very satisfactory, as the whole lot looked as well as could be desired. If this direct shipment can be utilized by Canadian shippers it would mean a very large saving in rates. The prices realized for this consignment, namely: 30 boxes at 3s. 6d. and 70 at 4s. 6d. were not as high as I expected, but this was owing to the enormous crop of Irish grown apples on the market and some very large consignments of States fruit. The crop of Irish apples this year is the largest for ten years, but will be very quickly worked off. The consignment you sent is the very thing we want here: good colour and sound, well packed, There is no market for Canadian or American green apples suitable only for cooking.'

(Signed) 'J. H. SHERIDAN.'

EXTRACT FROM REPORT OF FIFTH SHIPMENT (PATTEN'S GREENING, AND WEALTHY).

'GLASGOW, October 19, 1904.

'I beg to send you herewith account sale for your consignment of 40 boxes apples ex steamer *Parthenian*, and draft for £5 11s. 1d. sterling in settlement of net proceeds, which please acknowledge. I can assure you we did the very best possible with this lot of apples, and trust that the result is satisfactory to you. They arrived here in

prime condition and sold well under the conditions of the market. As you are doubtless, aware, large quantities of apples have been coming on the British markets this season and prices have ruled low, but for good coloured fruit lately we have experienced a strong demand in view of the near approach of Hallowe'en festivities, while for green fruit, such as Greening, Colverts and such like varieties, there has been a very poor sale owing to the large quantities of English and continental of like description.

(Signed) 'THOS. RUSSELL.'

EXTRACT FROM REPORT OF SIXTH SHIPMENT (WEALTHY AND M'MAHON WHITE).

'BELFAST, November 19, 1904.

'With reference to the last consignment of 25 boxes of apples, Wealthy and McMahon White, the Wealthy apples were certainly very nice, good flavour, but of course a shade smaller. I was unable to get a very big price for them. As I explained to you before, the Irish apples were so very plentiful, I sold them at 3s. a box to Lennon Bros. Are you able to quote apples in barrels yet, as there is a far greater demand for them than the boxes ?

'HUGH GORDON' (per).

SEEDLING FRUITS.

There have not been quite as many seedlings sent in this year as in 1903, but most of those received were above the average seedlings sent in for examination in the past. Full descriptions are published of those which were thought to be the most promising, and partial descriptions of those which are not of special merit.

As scions of most of the best seedlings which are received from year to year are obtained from the grower, a very fine collection of seedlings is being got together here, some of which should prove superior to those now generally grown.

It is hoped that anyone who has a promising seedling will send fruit for examination to the Horticulturist, Central Experimental Farm, Ottawa.

All the seedlings described below are apples, with the exception of one plum.

291. J. Gossley, Richmond Hill, Ont.—(No. 12 seedling). Medium size, sparsely splashed with purplish red. Quality good, but not attractive. Season, winter.

292. J. Gossley, Richmond Hill, Ont.—Medium size ; form roundish, slightly angular; cavity deep, open; stem broken; basin medium depth and width, smooth; calyx open; colour yellow, well splashed and washed with bright red; dots few, small, yellow, indistinct; skin moderately thick, tough; flesh yellow, crisp, tender, juicy; core medium; subacid, flavour pleasant; quality good to very good; season apparently mid to late winter. Tree said to be a cross between Canada Red, Baldwin and Spy. Much like Spy in appearance and flavour, but is not as good flavour as Spy.

293. F. C. Judd, Doe Lake, Ont.—Medium size, splashed and streaked with bright red, medium quality. Season, October.

294. F. C. Judd, Doe Lake, Ont.—Medium size; yellow, red about cavity; quality above medium to good. Season late September.

295. J. W. Morrison, Acton's Corners, Ont.—Above medium size, bright red, medium quality. Season late September to October.

296. J. W. Morrison, Acton's Corners, Ont—Medium size, pale yellow; quality above medium. Season September.

297. J. W. Morrison, Acton's Corners, Ont.—Medium size, pale yellow with a pinkish blush; quality above medium. Season early to mid-winter.

298. C. H. Snow, Cummings' Bridge, Ont.—Winter Greening; medium size, pale greenish yellow with a pinkish red blush, quality above medium. Season mid to late winter.

299. H. N. Grant, Newtonbrook, Ont.—Medium size; form roundish, slightly angular; cavity medium depth and width; stem medium length, slender; basin very deep, open, wrinkled; calyx open; colour yellow washed with dark red; dots obscure; skin thick, moderately tough; flesh yellow, tender, juicy; core small; mildly subacid, pleasant flavour; quality good; season probably mid to late winter. Seedling tree growing near fence. Colour too dark to be very attractive. Only fairly promising, though better in quality than most seedlings.

300. G. H. McMillan, Dunbar, Ont.—Medium size, yellow splashed and washed with purplish red; quality medium to above. Season mid to late winter.

301.—Samuel Greenfield, Ottawa East, Ont.—Above medium size; form roundish, conical, angular; cavity medium depth and width; stem short, slender; basin medium depth and width, wrinkled; calyx closed; colour yellow, almost entirely covered with deep crimson; dots moderately numerous, yellow, distinct; skin thick, tough; flesh yellow, moderately juicy, rather coarse; core medium; subacid, with a pleasant flavour; quality good; season evidently October and perhaps later.

Seedling originated by Mr. Greenfield. If this apple has better points than Wealthy it may be useful, but it is not as juicy nor as tender in the flesh as Wealthy, though perhaps a little higher flavoured.

302. Miss P. L. Baker, Oakville, Ont.—Size large; form roundish; cavity narrow, medium depth, lipped; stem short, slender; basin narrow, medium depth, almost smooth; calyx open; colour pale yellow, almost covered with crimson; dots obscure; skin thin, tender; flesh white; core medium; subacid, slightly astringent; quality good; season evidently late August to early September. Tree a seedling about ten years old. Blossomed for the first time this year. Blossoms very large. A handsome apple, resembling Red Astrachan very much in outward appearance, and probably a seedling of it. Resembles Langford Beauty and Russell in character of flesh and flavour.

303. E. Rakestrow, Township of Ryde, Muskoka District, Ont.—Above medium size; form oblate roundish; cavity deep, medium width, russeted; stem short, moderately stout; basin open, deep; calyx open; colour yellow, well washed with bright red; dots few, indistinct; skin thick, moderately tough; flesh yellowish, tender, juicy; core medium; subacid, sprightly, with a pleasant flavour; quality good; season evidently October. Tree quite hardy. Seed sown eight years ago by daughter of Mr. Rakestrow, had one apple in 1903 and fifty this year. Fourteen miles from Gravenhurst. A promising seedling. Not as high flavoured as Wealthy, but a good apple. Promising.

304. Thos. C. Paddon, 62 Bolton Avenue, Toronto.—Plum seedling; form broad oval; size above medium; cavity deep, narrow, abrupt; suture a distinct line, not depressed; apex rounded; colour dark, purplish red; dots numerous, small, yellow, distinct; bloom appears light; skin moderately thick, tough; flesh deep greenish yellow, juicy, firm; stone medium size, practically free; moderately sweet; quality medium to above. Tree said to be a seedling. 'Tree is an upright grower, stands about 25 feet high and is a good heavy cropper.' It resembles Lombard very much. Should be a good shipper. Domestica group.

305. E. Kenny, St. Vincent de Paul, Que.—Medium size; form roundish conical, angular; cavity medium depth and width, slightly russeted; stem medium length, slender; basin shallow, narrow, wrinkled; calyx partly open; colour yellow, well splashed and washed with rich red; dots moderately numerous, yellow and gray, distinct; skin moderately thick, tough; flesh crisp, tender, yellowish, juicy; core medium; briskly

subacid with a pleasant flavour; quality good; season late winter. Tree has been planted about 20 years. Fruit has large seeds. Said to keep until June. Resembles Rubicon somewhat. September 12, 1904, received 4 specimens of same apple from Mr. Kenny kept in an ordinary cellar. Still in condition for eating, but mildly subacid at this date. Evidently a good keeper.

306. Wm. Ogilvie, Ormstown, Que.—Size large; form oblate; cavity very deep, open; stem very short, stout; basin deep, medium width, almost smooth; calyx partly open; colour yellow, well splashed and washed with lively purplish red; dots few, large, gray, prominent; skin moderately thick, tough; flesh dull white, crisp, tender, juicy; core small; subacid, sprightly; quality good; season evidently early to mid-winter or later. A large handsome apple. Should make an excellent cooking apple, and is a good dessert variety also. Mr. Robert Brodie, Westmount, P. Q., received this apple from Wm. Ogilvie, Ormstown, Que., where it was grown. He thinks it may be a variety he used to call Hemmingford.

307. J. K. McKenzie, Rogers Hill, N.S.—Above medium size; yellow washed with bright red on sunny side; medium quality; season mid to late winter.

308-314. John McCarthy, Semiwagan Ridge, N.B.—Seven seedlings.

309. Seedling No. 2. Medium size; form roundish; cavity medium depth and width; stem broken; basin medium depth and width, almost smooth; calyx open; colour pale yellow well washed with crimson; dots few, small, pale yellow, indistinct; skin thick, tough; flesh white, juicy, tender; core medium; mildly subacid with a pleasant flavour; quality good to very good; season early winter. Resembles Fameuse very much. Evidently a seedling of it.

315. A. P. Stevenson, Nelson, Man.—Martha Crab seedling; size large; form roundish to oblate, conic, angular; cavity open, medium depth; stem medium length stout; basin narrow, medium depth, much wrinkled; calyx partly open; colour yellow, well splashed and washed with bright red; dots obscure; skin moderately thick, tender; flesh yellow, rather coarse, moderately juicy; core medium size, open; briskly subacid; quality medium; season evidently early September. A large, handsome apple which is said to have been grown from Martha Crab seed sent from the Experimental Farm, Ottawa, in 1896.

PLUMS.

Last winter was very hard on plums of the European and Japanese classes and most varieties were killed to the snow line. None of these plums have proven satisfactory here. There are, however, two seedlings of the Red June plum originated at the experimental farm which are hardier in the flower bud than any others which have been tested, and these bore some fruit this year. These have been called Togo and Oyama, and descriptions of them are given in this report. The crop of Americana and Nigra plums was the best we have ever had, both in quality and quantity, and the fruit sold well on the exchange here. Three American seedlings originated at the Central Experimental Farm were named this year, these being Gloria, Swift and Fitzroy. Descriptions of these follow. Among the newer Americana varieties which fruited this year the Admiral Schley, Bomberger, Lottie and Smith were the most promising. Descriptions of these are given also. One of our aims is to develop an

Americana plum with as tender a skin as the European, of good flavour and having a free stone. The nearest approach to this is the Welcome plum, originated at the Central Experimental Farm, and described in the report for 1903. Stones of this have been planted in the hope of getting an improvement in the next generation.

Togo (seedling of Red June).—Form roundish, somewhat heart-shaped; size above medium; cavity narrow, medium depth, abrupt; suture an indistinct, sometimes distinct, line, no depression; apex slightly flattened; colour deep red; dots numerous, small, indistinct; bloom moderate, bluish; skin moderately thick, tough; flesh yellow, firm, juicy; stone medium size, oval, slightly flattened, cling; sweet, acid next skin; quality good. A promising plum. Larger than Red June and better in quality. Handsome. Named Togo August 31, 1904, in honour of Admiral Togo. Triflora group.

Oyama (Botan seedling).—Form roundish to broad oval; size medium; cavity narrow, medium depth, abrupt; suture a distinct line, not depressed; apex rounded; colour deep red all over; dots obscure; bloom thin, pale bluish; skin moderately thick, moderately tender, bitter; flesh yellow, firm, juicy; stone small, oval, cling; sweet, not of rich flavour; quality, medium to above medium. Not specially promising. September 12, 1904. May be useful on account of hardiness of fruit buds. Triflora group.

Gloria (Wolf seedling).—Form oval to oblong, somewhat flattened; size large; cavity narrow, shallow, abrupt; suture a distinct line; apex rounded; colour uniformly bright red all over, or yellow mottled with red; dots few, yellow, small, distinct; bloom thin, bluish; skin thick, tough; flesh deep yellow, juicy; stone large, almost or quite free, oblong, considerably flattened; sweet; quality good. Owing to its large size and the almost freeness of stone, this is a promising variety. Americana group.

Swift (De Soto seedling).—Form broad oval, much flattened; size large; cavity narrow, shallow; suture merely an indistinct line; apex slightly flattened; colour yellow, mottled and washed with deep red; dots obscure; bloom slight; skin thick, moderately tough; flesh rather pale yellow, juicy; stone above medium, oval, semi-cling, almost free; flavour sweet, pleasant. A good plum and worth propagating. Americana group.

Fitzroy (Rolling-stone seedling).—Form roundish, slightly heart-shaped, flattened; size above medium to large; cavity narrow, shallow, abrupt; suture a distinct line, no depression; apex rounded; colour yellow, well washed with deep red; dots numerous, small, yellow, distinct; bloom moderate; skin thick, moderately tender; flesh rather pale, yellow, juicy; stone above medium size, flattened, roundish to oval, practically free; sweet; quality good. A good plum, but cracks some, which may be against it. Freeness of stone a good point. Americana group.

Admiral Schley.—Form roundish; size very large; cavity narrow, shallow; suture a distinct line; apex rounded; colour yellow, well washed with deep bronzy red; dots numerous, small, yellow, distinct; bloom thin, bluish; skin moderately thick, tough; flesh deep yellow, juicy; stone large, oval, flat, cling; sweet, of a rich flavour; quality very good. One of the best Americana plums yet tested. An improvement over Hawkeye. Americana group.

Bomberger.—Form roundish to broad oval; size very large; cavity shallow, narrow; suture a distinct line; apex rounded; colour yellow, more or less covered with deep lively red; dots few, small, yellow, distinct; bloom medium; skin thick, tough; flesh deep yellow, juicy; stone medium size, oval, flat; sweet and rich; quality very good. A very handsome plum. More attractive than Hawkeye. Promising. Americana group.

Lottie.—Form roundish; size large; cavity shallow, narrow; suture an indistinct line; apex slightly flattened; colour yellow, mottled and washed with red; dots obscure; bloom slight; skin thick, tough; flesh sweet, juicy; stone medium size, roundish, semi-cling; sweet, rich; quality good. A handsome plum of good quality. Propagate. Americana group.

Smith.—Form roundish to broad oval; size large; cavity narrow, shallow; suture a distinct line; apex rounded; colour yellow, mottled and washed with red; dots obscure; bloom light; skin thick, moderately tough; flesh yellow, juicy; stone rather large, oval, nearly free; sweet, rich; quality good to very good. A good plum. Promising. Americana group.

GRAPES.

There was never a finer crop of grapes at the experimental farm than there was this year, but owing to the unusually cool and cloudy summer and autumn only 32 varieties ripened thoroughly compared with 101 in 1903. As the varieties which ripened this year are those which will mature with the least amount of heat, a list of them is herewith given as a guide to those who wish to test grapes in the colder parts of Canada. These are given in order of ripening. Florence, Early Daisy, September 9. Manito, Champion, September 17. Golden Drop, Jewel, Moore's Early, September 26. Moyer, September 27. Wyoming Red, September 28. Campbell's Early, Lincoln (Read's Hybrid), Brant, Canada, Telegraph, Hartford, Potter, Pattison, Seedling No. 1, X Muscat Hamburgh, Northern Muscadine, Dracut Amber, Maxatawny, September 29. Peabody, September 30. Janesville, Early Victor, Cottage, Lutie, October 3. Early Ohio, October 4. Creveling, Marion, Jessica, Superb, October 6. Belvidere, October 8. Delaware, Lindley, Brighton, Moore's Diamond had some bunches about ripe October 6.

The following new variety is described for the first time in this report.

Lincoln (Read's Hybrid).—Concord female X Black Hamburgh male. In 1897 three vines of this grape were sent for test by Mr. M. A. Read, Port Dalhousie, Ont., son of Wm. H. Read, the originator.

This variety has proven so valuable here, and should prove so valuable even in the best grape districts, that it deserves especial mention. The vine is a vigorous grower and very productive. The bunches are below medium size, but well filled, from 4 to 5 inches in length, compact, cylindrical or slightly shouldered. Fruit below medium size, round, black with a moderate bloom. Skin thick, tough; pulp moderately firm, but breaks fairly easily. Sweet, sprightly, slightly foxy; flavour somewhat like Concord with a suggestion of Black Hamburgh. Quality almost good. This is attractive in appearance and ripens about the same time as Moore's Early and would probably make a good shipping grape. Very promising.

In a letter received from Mr. M. A. Read, Port Dalhousie, Ont., dated December 1, 1904, further information was obtained regarding this variety. He writes:—

'The Black Hybrid grape received by your department in the year 1897 was originated by my father, the late Wm. H. Read, in the year 1887. It is a cross between the Concord and Black Hamburgh; Concord for female and Hamburgh for male. The original vine stood the test equally as well as the Concord thus far and is much more prolific, very compact, well shouldered bunch, berry medium size and of good quality, ripens about with Champion or Moore's Early, and a vigorous grower. This variety has taken first premium wherever exhibited and a special award of a silver medal at the Pan-American Exhibition, Buffalo, on its merits.'

BUSH FRUITS.

The raspberry, currant and gooseberry crops were all good this year. The Herbert raspberry continues to be the best main crop red variety tested here. The Brighton and Count are two hardy and very productive seedlings of Dr. Wm. Saunders, but are not equal to the Herbert in size or quality. The Sarah, another of Dr. Saunders' seedlings, is the finest in quality, but the colour is rather dark and it is not productive enough. Heebner and Clarke, resembling each other very much, are two desirable varieties for home use, being hardy, productive and of good quality. Cuthbert is too tender for this district.

The blackberry crop was a failure here this year.

STRAWBERRIES.

The strawberry crop was somewhat lighter than usual this year, not owing to unfavourable weather this season, but on account of the protracted drought in 1903, which delayed planting until June 15. Being planted so late, fewer runners were formed than usual, hence the crop was less. The plants came through the winter well, being practically uninjured.

For general purposes, the following varieties have proven among the most satisfactory, after a number of years' tests : Sample, P., Buster, P., Bisel, P., Glen Mary, B., Greenville, P., Beder Wood, B., Marie, P., Warfield, P., Enhance, B., Howard's 41, P., Barton's Eclipse, P., Thompson's Late, P. In addition to these are William's B., for shipping long distances and Bubach, P., for near market or home use. Lovett, B., is also a good, perfect berry for general purposes and for home use. Daisy is very handsome and productive, but soft. Afton, Steven's Early and Daniel Boone all resemble Warfield so much that they cannot be distinguished from it. Among the newer varieties which fruited this year for the first time, the following are considered promising :—

Pocomoke, B.—This was the most productive variety in the plantation this year, size large to very large; form obtusely conical; colour, bright glossy red but inclined to have white tip; very firm; flesh juicy, briskly subacid; quality above medium. Season medium to late. Plant a vigorous grower with good foliage. Quite promising as a productive berry for long shipment.

Lyon, P.—Size medium to above medium; form long, pointed or wedge-conical; colour deep red; moderately firm; flesh juicy, briskly subacid, pleasant flavour; quality good. Season early to medium. Plant a vigorous grower, with good foliage. A productive variety which this year ripened a good deal of fruit early.

Early Beauty, P.—Size medium to above medium; form roundish; colour deep glossy red; moderately firm; flesh juicy, briskly subacid; quality above medium. Season very early. Plant a vigorous grower, with healthy and abundant foliage. One of the most promising early varieties.

Splendid.—This variety was grown for a number of years and then discarded, but is being given a further test with a new strain. It is a very productive variety but is soft and not attractive in colour.

In the following table will be found a list of fifty varieties of strawberries arranged in their order of merit or rank, from the average of two to four years' test. Most of these have been tested for four years, namely, 1900, 1901, 1902, 1904. The crop was practically a failure in 1903. Their rank for the year 1904 is also given in the table, as well as other information. In addition to the list of fifty varieties, a short list of twelve follows, representing the best yielding varieties fruiting for one year only. There were 196 named varieties under test this year, and 53 unnamed seedlings. In the tables B. stands for bi-sexual or perfect, while P. stands for pistillate or imperfect :—

Most productive 50 varieties of Strawberries for an average of from 2 to 4 years.

Average Rank.	Number of years averaged.	Rank, 1904.	Name.		Date of full bloom, 1904.	Date of first ripe fruit, 1904.	Date of first picking, 1904.	Date of last picking, 1904.	Number of pickings, 1904.	Weight of 25 average berries, 1904.	Total yield, 1904.		Average total yield.	
										Oz	Lbs.	Oz.	Lbs.	Oz.
1	3	84	Mele	P..	May 19	June 20	June 18	July 18	11	5	7	6¾	24	13½
2	4	9	Sample	P..	June 4	" 19	" 22	" 18	10	6½	17	4½	22	13⅜
3	4	85	Buster	P..	" 2	" 20	" 22	" 15	9	7	17	4½	22	2½
4	4	5	Bisel	P..	" 2	" 19	" 22	" 18	10	7¼	18	11½	21	12
5	4	23	Afton	P..	May 30	" 17	" 20	" 18	11	5½	13	5½	21	8½
6	4	29	Steven's Early	P..	June 2	" 17	" 18	" 15	10	6¾	12	14¼	20	14
7	4	14	Glen Mary	B..	" 2	" 19	" 22	" 15	9	7¾	15	15	20	14
8	4	94	Daisy	P..	" 6	" 20	" 22	" 15	9	6	6	14¾	20	10
9	4	40	Greenville	P..	May 21	" 17	" 20	" 15	10	7	11	5	20	4½
10	4	11	Daniel Boone	P..	June 2	" 18	" 20	" 18	11	7	16	6¾	20	00
11	4	60	Howard's 41	P..	May 25	" 19	" 22	" 18	10	6	9	3½	19	12
12	4	34	Enhance	B..	" 30	" 22	" 24	" 18	9	8	11	15¼	19	7¾
13	4	54	Warfield	P..	" 28	" 17	" 18	" 18	12	5	9	11½	18	12
14	2	36	Marie	P..	June 2	" 17	" 18	" 18	12	7	11	9¾	18	3½
15	4	12	Beder Wood	B..	May 29	" 18	" 20	" 15	10	6	16	6	18	2
16	4	50	Carleton	P..	June 2	" 20	" 22	" 18	10	5½	9	14	17	15½
17	3	44	Cole's Seedling	B..	" 5	" 25	" 27	" 18	9	6¾	10	14½	17	13½
18	4	25	Barton's Eclipse	P..	" 2	" 18	" 20	" 18	11	6¾	13	3¾	17	13½
19	4	20	Hattie Warfield	P..	May 29	" 16	" 18	" 18	12	5¾	14	5½	17	11½
20	4	102	Thompson's Late	P..	June 4	" 21	" 22	" 18	9	6	6	8¾	17	7
21	4	110	Dora	P..	" 2	" 18	" 20	" 18	11	5½	6	1½	17	7
22	4	45	Maggie	P..	" 2	" 17	" 18	" 18	12	5½	10	13	17	5¾
23	4	16	Bubach	P..	" 4	" 19	" 22	" 18	12	7	15	10½	16	12¾
24	4	8	Swindle	P..	May 29	" 21	" 22	" 18	11	6½	17	6½	16	12½
25	4	72	No Name	B..	June 2	" 20	" 22	" 18	10	5¾	8	13¾	16	8
26	4	7	Crescent	P..	May 29	" 18	" 20	" 18	11	5¾	17	12½	16	5¼
27	4	10	John Little	P..	June 2	" 19	" 20	" 18	11	5	17	0¾	16	4¾
28	4	125	Wonderful	P..	" 2	" 18	" 20	" 15	10	6¼	4	14	16	2¾
29	4	96	Williams	B..	May 28	" 20	" 22	" 15	9	6	6	14	15	14
30	4	22	Clyde	B..	" 30	" 19	" 22	" 18	10	8	13	5½	15	12¼
31	4	78	Arkansas Traveller	B..	June 4	" 22	" 24	" 18	9	6½	7	9½	15	11⅜
32	4	66	Parker Earle	B..	May 29	" 16	" 18	" 18	12	6	8	12¼	15	7½
33	4	68	Carrie	P..	June 4	" 24	" 27	" 18	9	7½	8	7	15	7¼
34	4	39	Bomba	P..	May 30	" 18	" 20	" 15	9	6	11	5½	15	3¼
35	4	46	World's Champion	B..	June 5	" 20	" 24	" 18	9	6½	10	11½	15	2
36	4	114	G. H. Caughell	B..	May 25	" 16	" 18	" 15	11	4½	5	11¾	14	12¼
37	4	124	Dr. Arp	P..	" 29	" 18	" 20	" 18	11	...	4	14¾	14	9¼
38	4	32	Tennessee Prolific	B..	" 30	" 19	" 22	" 15	9	7	12	6¾	14	6¾
39	4	83	Lovett	B..	June 4	" 18	" 20	" 18	10	5¼	7	7	13	15
40	4	113	Cyclone	P..	" 2	" 19	" 22	" 18	9	5½	5	12½	13	15
41	3	31	Senator Dunlap	B..	May 29	" 16	" 18	" 18	12	6½	12	10⅝	13	13½
42	4	89	Kyle	B..	June 2	" 20	" 24	" 15	8	5¾	7	1	13	6¼
43	4	70	Enormous	P..	May 27	" 20	" 22	" 15	9	8¼	8	2½	13	4
44	4	26	Anna Forest	P..	June 2	" 18	" 20	" 11	9	5¼	13	0¾	13	3¼
45	4	57	Hood River	P..	" 4	" 20	" 22	" 18	11	6¼	9	8¾	13	2¼
46	4	6	Boynton	P..	" 2	" 17	" 18	" 15	12	4⅝	18	0¼	12	1½
47	4	117	Brandywine	B..	" 4	" 23	" 24	" 18	8	6¾	5	9	12	15
48	4	43	Wm. Belt	B..	" 2	" 21	" 22	" 15	8	6¼	11	0	12	7¼
49	4	104	Satisfaction	B..	" 4	" 20	" 22	" 18	10	5	6	6	12	7¼
50	4	64	Morgan's Favorite	B..	" 2	" 23	" 24	" 15	9	...	8	13¾	12	6¾

Most productive 12 varieties fruited for one year.

...	...	1	Pocomoke	B..	June 2	June 22	June 24	July 15	9	7	22	2	...	...
...	...	2	Lyon	P..	" 2	" 20	" 22	" 18	11	7	20	13⅜	...	...
...	...	3	Warfield (Kellogg)	P..	May 28	" 17	" 18	" 18	12	5¼	19	14¼	...	...
...	...	4	Splendid (new strain)	B..	June 2	" 20	" 22	" 18	10	6	19	14¼	...	...
...	...	15	Early Beauty	B..	May 29	" 15	" 18	" 6	9	5	15	12½	...	...
...	...	28	Success	B..	June 4	" 29	" 22	" 18	11	6¼	12	15	...	...
...	...	30	Tilgman	P..	" 6	" 24	" 27	" 18	9	...	12	13	...	...
...	...	56	Superior	B..	May 25	" 16	" 18	" 8	10	5	9	8¾	...	...
...	...	63	Monitor	B..	June 2	" 18	" 20	" 15	10	6½	9	0¼	...	...
...	...	71	Big Bobs	B..	" 4	" 22	" 24	" 15	10	8	8	1¾	...	...
...	...	75	Minute Man	P..	" 2	" 18	" 20	" 18	12	6	7	10½	...	...
...	...	82	Latest	B..	" 6	" 24	" 27	" 18	9	7	7	7½	...	...

FUNGOUS DISEASES.

With the exception of the Black Rot of the grape, fungous diseases were not unusually prevalent this year. Owing doubtless to the almost entire absence of Black Spot of the apple in 1903 in eastern Ontario and the province of Quebec, there was much less spot this year than usual, although some unsprayed orchards were badly affected. In western Ontario, however, the spot was about as bad as usual in unsprayed orchards, while in orchards well sprayed the fruit was clean. As the plum crop was almost a complete failure, the Ripe Rot was not bad, but grapes suffered to such an extent with Black Rot that growers have become alarmed, and for this reason some space is devoted to diseases of the grape in the report this year.

DISEASES OF THE GRAPE IN ONTARIO VINEYARDS IN 1904.

Knowing that rot was causing serious damage in a number of vineyards in the Niagara peninsula, I took the opportunity on September 13 and 14, of visiting some of them in the hope of learning something that would prove suggestive in fighting the diseases of the grape and of obtaining other information that would be useful to fruit growers regarding the different kinds of rot which were causing loss. On September 13, accompanied by Mr. W. H. Bunting, of St. Catharines, Ont., I visited his vineyard and others in the neighbourhood of St. Catharines. Mr. Bunting had sprayed seven times and his fruit was only slightly injured. He had bagged 1,000 bunches when the grapes were the size of peas in order to find out if infection took place before that time. Most of the bunches thus bagged were perfect, but some had the Black Rot in various stages of development, showing that infection had taken place before the grapes were as large as peas. The Niagara grape was the variety most affected in Mr. Bunting's vineyard. Several vineyards of Concord near Mr. Bunting's were examined, but Black Rot had not worked to any extent in them. Brown Rot was, however, found in one vineyard, but it had not done much injury to the fruit. Another vineyard, probably of about fifteen acres, was visited, consisting principally of Concord, Brighton, Niagara and Moore's Early. Of Niagara and Brighton there was scarcely a sound grape anywhere, and none of the bunches of Concord even with manipulation could be made fit for market. Moore's Early was not affected. This vineyard had not been sprayed.

The infection by the Black Rot as it appeared in the vicinity of St. Catharines was first noticed on the fruit as a round, brownish coloured spot about the size of the head of a pin. This brownish appearance gradually spread over the surface of the berry and by the time one-third of the surface was covered in this way the original brown spot had become paler, showing distinctly the mark of infection. After the whole grape became brown, the tissue gradually shrunk and dried and when thus shrunken the fruit appeared black and prominently and irregularly ridged, the surface being covered by small black pustules. On September 14, I visited the vineyards of Mr. Murray Pettit, Winona, Ont., and other vineyards in that vicinity. No Black Rot was noticed at Winona, but Brown Rot was quite abundant, and while it had not caused such damage as the Black Rot, it had done considerable injury. The leaves of the vines affected with Brown Rot had a velvety or downy appearance underneath The affected fruit first showed a brownish spot or patch one one side and a shrinking of the tissue. This brownish appearance spread all over the grape and the whole grape eventually shrunk into a hard shrivelled mass. When badly affected the vine looses a large amount of foliage. Powdery mildew was also found in these vineyards.

The Niagara grapes, both in Mr. Pettit's and adjoining vineyards, were affected this year with either a new disease or more probably, as Prof. Selby suggests, a condition caused by either Powdery Mildew or Brown Rot affecting the stem to which the grape is attached. This disease caused a hardening of the grape and gave it a pale, unhealthy colour.

Another disease of the grape which was doing a great deal of injury at Winona was what we took to be the Grape-leaf Blight; a disease which has not received the attention which it deserves. This blight causes the leaves to wither and drop, thus preventing a free circulation of sap and the proper development and maturing of the fruit.

The diseases of the grape can be controlled by thorough spraying, but the work must be done persistently and carefully.

FUNGOUS DISEASES OF THE GRAPE.

Anthracnose: Bird's Eye Rot: Scab (*Sphaceloma Ampelinum*).—This is the only grape disease which has given any trouble at the Central Experimental Farm. It is difficult to control by spraying, but, fortunately, only a few varieties have been affected, Lindley being the worst. This fungus attacks leaves, stems, and fruit, but it is on the fruit where it is most noticed. The disease is apparent in depressed patches extending along the stems, which checks the growth. There are also reddish brown patches on the leaves. The stems of the clusters of grapes are frequently affected, and when the disease occurs there the fruit remains green and eventually withers, making an imperfect bunch. The disease on the fruit occurs in roundish brown depressed spots with a purplish margin, giving somewhat the appearance of a bird's eye. Frequently spots unite and form a large irregular area. This is a very difficult disease to control, and thorough spraying with Bordeaux mixture has not checked it to any extent. Spraying before the buds open; before blossoming; after fruit has set and ten days later with Bordeaux mixture is recommended.

Black Rot (*Laestadia Bidwellii*).—Up to quite recent years this disease was thought to have reached its northern limit, south of lakes Erie and Ontario, but during the last few years in Essex county, and more recently in the Niagara peninsula, it has caused much damage. The appearance of this disease has already been described, but something further must be said regarding it. The spores live over winter on the vines and in the affected grapes, and germinate when growth starts in the spring. The disease attacks the leaves and young shoots, the leaves showing the disease in roundish reddish brown patches, and on the stems it appears in small, long shaped, dark brown, slightly depressed spots, on the surface of which appears the characteristic pustules of the Black Rot. When conditions are favourable, the disease only requires from 8 to 12 days from the time the spore germinates until the mycelium has run its course through the fruit and has produced new spores. Before the grape shrinks much in size the mycelium concentrates, as it were, in small masses underneath the skin, and in these are produced the spores. These masses soon break through the skin and the black pustules with the spores appear. The spores are scattered and they reinfect other fruits and vines. Although it is possible for a new generation of spores to be borne within two weeks, it requires favourable weather conditions for the disease to develop. While early sprayings have in some cases not been found to give the results expected, the life history of the disease shows that it must be wise to endeavour to destroy as many spores as possible at or before the first infection. The first spraying should be made just before blossoming, the second just after the fruit has set, the third and fourth at intervals of about a week—all with ordinary Bordeaux mixture. There should then be three sprayings with Ammoniacal Copper Carbonate or Soda Bordeaux, which will not discolour the fruit to any extent. Although the disease will probably not be eradicated from a vineyard in one season, the more thoroughly the spraying is done the less trouble there should be. It is now sixteen years since it was conclusively shown that Bordeaux mixture would control this disease.

Brown Rot: Downy Mildew: Gray Rot (*Peronospora viticola*).—This is the rot which up to quite recent years proved most injurious in Ontario. The general appearance of this rot as it affects the fruit has already been noticed. Like the Black

Rot, it affects leaves, stems, and fruit. The disease causes slightly depressed patches on the shoots, somewhat like Anthracnose, but are not so deep. The stems, however, are not usually badly affected, but it is the leaves and fruit which suffer most. Unlike the Black Rot, in which the mycelium does not extend far into the tissue of the plant, in the case of Brown Rot once an infection takes place the disease spreads through the tissues of the vine; and when the leaves are affected they turn pale where the disease has been at work, and about this time the under part of the affected part of the leaf becomes downy, indicating the presence of spores and presenting the 'Downy Mildew' stage of the disease. After this the affected parts of the leaves turn brown. As previously stated, the diseased condition of the fruit is indicated by a brown patch which spreads over the whole grape, which gradually withers. The absence of black pustules readily distinguish this at this stage from the Black Rot. Sometimes after the fruit has withered it becomes covered with a white powdery substance, indicating the spores, but these do not always develop. Treatment.—Spray with Bordeaux mixture just before blossoming, after fruit has set, and ten to fourteen days later.

Powdery Mildew (*Uncinula spiralis*).—This disease does not penetrate into the tissue of the plant as the Black and Brown Rot, but grows upon the surface, making it much easier as the Black and Brown Rot, also, it spreads more rapidly in rather dry weather. The mildew grows on the young shoots and upper surface of the leaves and on the fruit, giving them a grayish, powdery appearance easily recognized as being caused by the Powdery Mildew. This disease feeds on the plant by sending small suckers into the plant cells from which it gets food. Spores are produced early in the season and these being scattered about soon infect other leaves or vines and spread the disease. A second crop of spores is produced later in the summer and these carry the disease over the winter. These are enclosed in a hard, roundish case which becomes black during the latter part of the season. Treatment.—This is a very easy disease to treat and yields readily to fungicides. Dry sulphur and sulphur and water have been found effective, but as this disease often accompanies other diseases of the grape, the sprayings with Bordeaux mixture recommended for Black and Brown Rot are preferable and will effectually check it.

Ripe Rot.—A species of ripe rot has affected a few varieties at the Central Experimental Farm, Salem and Peabody being two of the most affected. The fruit is quite plump and juicy up to the last, but about the time of ripening, the fruit turns brownish at the affected part and often bursts.

Grape Leaf Blight (*Cladosporium viticolum*).—A disease noticed in the vineyards at Winona, Ont., is undoubtedly this species. It causes a withering of the leaves somewhat like the Brown Rot, but the fruit is not affected nor has the under surface of the leaf the downy appearance of the Brown Rot. The leaves on the vines at Winona had the burnt appearance which is peculiar to many leaf blights. The patches on the leaves indicating the disease, are large and irregular in outline. These patches become quite dry and will break from the leaf very easily. The spores are borne on the under surface of the leaf on slender filaments and are produced in large numbers during damp weather. This disease lives over the winter in the fallen leaves. It has not received very much attention but it weakens the vines and prevents the full development of the fruit. Spraying the vines, as for Black Rot, should prove quite effectual with this disease.

COVER CROPS.

English Horse Beans and Rape.—In the report for 1903, experiments in the use of the English Horse Bean and Hairy Vetch were described. It was shown that Horse Beans and Hairy Vetch sown in rows 28 inches apart had given very satisfactory

results. These were sown in this way because it is sometimes difficult to get a good 'stand' for a cover crop in the autumn by sowing about the middle of July and later, owing to the dry weather which often occurs after seeding, delaying the germination of the seed, and in the north it is very desirable to have the cover crop tall so that it will hold the snow. By sowing the seed in rows it can be sown comparatively early and the soil cultivated between the rows when the plants come up, thus conserving moisture and making sure of a good cover crop. Cultivation may be discontinued about the middle of July or a little later. The Horse Beans sown on June 18, 1903, were from 3 feet 6 inches to 4 feet in height on September 21, and it was estimated that the green crop per acre was 7 tons 733 pounds above ground and 2 tons 852 pounds of roots, or a total of 9 tons 1,585 pounds per acre, containing according to the figures given by Mr. Frank T. Shutt, Chemist of the Experimental Farms, in his report for 1903, 78 pounds of nitrogen as compared with 130 pounds from Mammoth Red Clover, and 147 pounds from Hairy Vetch. These beans stood up well all winter, holding the snow admirably, and by spring were still 2 to 2½ feet in height. A land roller was put on as soon as the soil was in condition to work, and the beans were rolled down. The disc harrow was then used and it was found that they broke up readily; they were then cultivated in with a spring tooth cultivator. Owing to the coarse nature of the stems they were noticed in the soil longer than clover or vetch, but in a comparatively short time they decayed and gave practically no trouble. Horse beans were again sown in drills this year on June 16, and were 3 feet 5 inches in height when frozen. The advantage of Horse Beans is that they winter kill and are easily worked under in the spring, while Hairy Vetch and Clover are more difficult to deal with, and if left until late in the spring will take considerable moisture from the soil. The disadvantage of the Horse Bean is that there is no mat of vegetation close to the soil, and if there should be a winter without snow it might not prove as effective as Red Clover or Hairy Vetch. In order to ensure a mat of vegetation which would cover the ground in winter and which would be dead in the spring, rape was used in one part of the orchard and it is believed that English Horse beans and rape grown together will prove one of the most satisfactory cover crops where they will succeed. The Horse beans will furnish nitrogen and humus and will hold the snow well. The rape will cover the ground, thus protecting the roots, and will also add humus. At Ottawa, Horse beans sown during the last week of June at the rate of one bushel per acre in drills 28 inches apart and cultivated two or three times, and rape sown broadcast between the rows during the latter half of August should furnish a very satsfactory combination. Both English Horse beans and rape are moisture-loving plants and will not succeed as well in dry soils as they will where there is a fair amount of moisture Where the Hairy Vetch is grown for seed, Horse beans sown in drills at the same time as the vetch should prove very useful the following season in holding up the vines, thus insuring a larger crop of seed. At our suggestion, one grower tried it this year and is favourably impressed with this method.

Hairy Vetch.—The Hairy Vetch was used quite largely in the orchards at the Central Experimental Farm in 1903, and was sown again this year, both alone and broadcast and also with Horse Beans to form a mat on the ground, and has been found satisfactory for this purpose, but owing to the difficulty of ploughing under, rape would appear to be more suitable. The Hairy Vetch is a very rapid grower and will continue to grow until almost winter, as light frosts have apparently little effect upon it. It forms a thick mat on the ground, making a perfect mulch and an ideal cover for preventing the thawing and freezing of the ground and protecting the roots of the trees. It will not hold the snow as well as the taller plants, but will probably be found as a rule satisfactory enough in that respect. It is quite rich in nitrogen, being more so than the Mammoth Red or Common Red clovers. The great disadvantage of the Hairy Vetch is the difficulty in ploughing it under where it lives over the winter. Sown broadcast, from 30 to 40 lbs. per acre is

sufficient to give a good stand under favourable conditions, and 20 lbs. per acre has been found sufficient when sown in rows. It was not winter killed at the Central Experimental Farm last winter and soon began to make rapid growth in the spring. On June 2 it was cut, with the object of mulching the ground with the crop, the plan being to cut at intervals throughout the summer as with Red clover and use each cutting as a mulch. The vetch, however, was killed by the first cutting. It was thus not found satisfactory as a crop for mulching. Mammoth Red and Common Red clover sown broadcast at the rate of 10 or 12 pounds per acre about the middle of July proves very satisfactory as cover crops in those sections, such as eastern Ontario, where they make good growth in the autumn. Ploughed under in the spring, Red clover adds much plant food and humus to the soil, and in orchards where there is usually an abundance of moisture, such as the orchard at the Central Experimental Farm, it has been found quite satisfactory to cut the clover several times during the summer instead of ploughing it under in the spring, leaving the green crop as a mulch on the ground.

CONSERVATION OF MOISTURE.

As the conservation of moisture is one of the chief reasons for the cultivation of orchards in the summer, any method which will bring about as good results as cultivation without going to the expense and trouble would be very acceptable. It is claimed for the so-called mulch method, by which the grass grown in an orchard in sod is used about the trees to conserve moisture, that the results obtained are quite as satisfactory as with clean cultivation, but it has been found in certain cases that where such good results have been obtained the soil is naturally moist. This year an experiment was planned in conjunction with Mr. F. T. Shutt, Chemist, to determine if there were any crops which would conserve, by the mat they formed on the ground, almost or quite as much moisture as they transpired through their leaves. The extremely cool wet season was unfavourable for this work, but the results of the test will be found in Mr. Shutt's report.

VEGETABLES.

Experiments with vegetables were continued this year, but the list of varieties was cut down very considerably, as sufficient information has now been obtained of a great many of them to warrant discarding them. Those that are recommended are tested each year for comparison with the newer kinds which are being constantly offered for sale. The season was favourable for all vegetables except those which required much heat, such as melons, peppers, and tomatoes, and the crop of these was much less than usual. Cutworms were very bad and injured the test of pease so much that this season's results are worthless. Bran and Paris green in the proportion of 1 lb. Paris green to 50 lbs. bran has been found to be the best remedy for cutworms yet tried, as if applied in time the cutworms will aparently eat it in preference to living plants.

Selection of Pease and Beans.—During the past five years an experiment has been in progress in selecting garden pease to develope, if possible, earlier and more productive strains. The results are very encouraging and the effect of selection in regard to increase of yield and earliness is quite marked in some cases. A similar experiment has been carried on with beans for four years, and more recently with tomatoes and melons. There is a wide field for work of this kind, especially in this climate, where earliness is such an important factor in determining the profits from vegetables.

Further experiments in growing vegetables in a cheese-cloth inclosure.—The experiment begun and reported on last year of growing vegetables in a cheesecloth in-

closure was continued this year with results confirming those of last year in some respects, while in others owing to the extremely cool, cloudy season the difference in favour of cheesecloth was not so marked, and in some cases vegetables which had done better in 1903 inside than out, this year did better outside than in. Radish, cauliflower, lettuce, beans, and onions were tested this year. It was again found that radish and cauliflower grown inside the inclosure were free of maggots except in an occasional instance in the case of the cauliflower where the plants had evidently been affected in the hot-bed before setting out in the inclosure. This preventative of root maggots should be more widely utilized, especially among amateurs, where these insects are troublesome. Both radish and cauliflower develope very satisfactorily in the inclosure. In 1903 radish was ready for use inside the inclosure three days earlier than outside, this year radishes were two days later than outside, but the radishes remained fit for use nearly a week longer inside than out, the radishes, when they had reached a large size, being still crisp and tender. Whether it would pay commercially or not is still doubtful. The cauliflower outside was practically a failure, inside it was quite satisfactory. Lettuce was ready for use in 1903 in the inclosure two to four days later than outside; this year it was ready two days earlier inside. Beans were ready for use in 1903 in the inclosure three days sooner than outside, and the yield was 14 quarts outside and 11 quarts inside. This year the beans were ready for use inside one to two days later than outside, the yield inside being 58 quarts, while outside it was 53 quarts. There was no apparent difference between the onions planted outside and inside.

The cheesecloth used in 1903 was used again this year, but it tore considerably during the latter part of the season, and gave trouble. Two years is the longest time that this cheesecloth, which cost 5 cents a yard, may be expected to last.

POTATOES.

The season of 1904 was favourable to the potato crop at the Central Experimental Farm, as the blight did not appear until late, and there was little rot in the field. The yields of 73 varieties are published in the following table, all grown in the same sized plots. The Vermont Gold Coin, which was tested for the first time in 1903, headed the list this year, yielding at the rate of 554 bushels 24 pounds per acre. This is a very promising variety. Between this variety and the lowest yielder, the Early Andes, which only yielded at the rate of 123 bushels 12 pounds per acre, there is a difference of 431 bushels 12 pounds per acre, which is more than three times the average yield per acre for the province of Ontario, striking evidence of the importance of planting only the most productive varieties.

The soil in which the potatoes were planted was good sandy loam, the previous crop being strawberries. The soil was given a heavy dressing of barnyard manure for the strawberries in the spring of 1902, but had not received any since. The land was ploughed in the summer of 1903, and again in the spring of 1904, and thoroughly harrowed with the disc and smoothing harrows shortly before planting. The drills, which were 2½ feet apart, were made with the double mould board plough and were about 4 inches deep. The sets were of good size, having at least three eyes, it having been found that, taking one year with another, this is the best kind to use. There were 66 sets of each variety planted 1 foot apart in a single row. The sets were covered with the hoe to ensure more uniform conditions. Level cultivation was adopted and the potatoes were cultivated four times, and sprayed four times with Bordeaux mixture.

TWELVE BEST YIELDING POTATOES—AVERAGE OF FIVE YEARS, 1900 to 1904.

Name of Variety.	Season.	Colour.	Quality.	Average Yield per Acre, 1900 to 1904.	
				Bush.	Lbs.
1. Dr. Maercher	Very late	White	Med. to good	496	19
2. Late Puritan	Medium	"	Good	485	19
3. Burnaby Mammoth	"	Pink and white	"	483	34
4. Money Maker	"	White	"	482	41
5. Carman No. 1	Medium	White	"	459	48
6. Dreer's Standard	"	"	"	458	55
7. Sabean's Elephant	"	"	"	454	58
8. Canadian Beauty	"	Pink and white	"	452	46
9. Rural Blush	Late	Pink	"	437	48
10. I.X.L	Medium	Pink and white	"	433	50
11. Pearce	"	Pink and white	Good	433	24
12. Clay Rose	"	Pink	Medium	432	58

* This variety was first grown under the name of Burnaby Seedling, and then procured under the name of Burnaby Mammoth. The average yield from the older strain for four years, and the new one for one year is 469 bushels 29 lbs.

POTATOES—TEST OF VARIETIES.

Name of Variety.	Season.	Quality.	Total Yield per Acre.		Yield Per Acre, Marketable.		Yield Per Acre of Unmarketable.		Colour.
			Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1 Vermont Gold Coin	Medium	Good	554	24	475	12	79	12	White.
2 Morgan's Seedling	"	"	514	48	413	36	101	12	Pink and white.
3 Carman No. 1 (new seed)	"	"	501	36	409	12	92	24	White.
4 Dr. Maercher	Late	Medium	501	36	382	48	118	48	"
5 Dooley	Medium	Good	479	36	409	12	70	24	"
6 Rural Blush	Late	"	479	36	391	36	88	0	Pink.
7 White Elephant	Medium	"	466	24	409	12	57	12	" and white.
8 Burnaby Mammoth	"	"	462	0	396	0	66	0	" "
9 Quick Crop	Early	"	448	48	382	48	66	0	" "
10 Northern Beauty	"	"	440	0	356	24	83	36	"
11 Carman No. 3 (new seed)	Late	"	435	36	391	36	44	0	White.
12 Holborn Abundance	"	Medium	435	36	369	36	66	0	"
13 Carman No. 1	Medium	Good	435	36	330	0	105	36	"
14 American Giant	"	Medium	431	12	365	12	66	0	"
15 Doherty's Seedling	"	Good	431	12	356	24	74	48	"
16 Early Carter	Early	"	426	48	334	24	92	24	"
17 Money Maker	Medium	"	418	0	347	36	70	24	"
18 Reeve's Rose	Early	"	404	48	343	12	61	36	Pink.
19 Montana Bluff	Medium	"	404	48	334	24	70	24	White.
20 Mammoth Pearl	"	"	400	24	334	24	66	0	"
21 Clark's Pride			400	24	286	0	114	24	"
22 Clay Rose	Late	Medium	391	36	338	48	52	48	Pink.
23 Crines Lightning	Early	Good	391	36	334	24	57	12	Red, brighter in eye.
24 Everett	"	"	387	12	316	48	70	24	Pink.
25 Rose No. 9	Late	Medium	382	48	356	24	26	24	"
26 Vick's Extra Early	Early	Good	378	24	325	36	52	48	" and white.
27 Pearce	Medium	"	378	24	321	12	57	12	" "
28 Penn Manor	Early	"	374	0	334	24	39	36	" "
29 Rochester Rose	"	"	374	0	281	36	92	24	"
30 Napoleon	"	"	369	36	272	48	96	48	"
31 Canadian Beauty	Medium	"	365	12	321	12	44	0	" and white.
32 Van Orman's Earliest	Early		365	12	308	0	57	12	"
33 Sabean's Elephant	Late	Good	365	12	303	36	61	36	White.
34 I. X. L	"	"	365	12	294	48	70	24	Pink and white.
35 Jubilee	Medium	"	365	12	286	0	79	12	" "
36 John Bull			360	48	316	48	44	0	"
37 Empire State	Medium	Good	360	48	299	12	61	36	White.
38 Peck's Early	Early		360	48	294	48	66	0	Pink.

POTATOES—TEST OF VARIETIES—*Concluded.*

No.	Name of Variety.	Season.	Quality.	Total Yield per Acre.		Yield Per Acre, Marketable.		Yield Per Acre of Unmarketable.		Colour.
				Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
39	Dreer's Standard	Late	Good	356	24	299	12	57	12	White.
40	Flemish Beauty	Medium	"	347	36	286	0	61	36	Bright pink.
41	Late Puritan	Late	"	343	12	290	24	52	48	White.
42	Early Rose	Early	"	343	12	277	12	66	0	Pink.
43	Morgan's White	Medium		343	12	272	48	70	24	White.
44	Eureka Extra Early	E. early		338	48	281	36	57	12	"
45	Swiss Snowflake	Late	Good	334	24	272	48	61	36	"
46	Rawdon Rose	Early		334	24	268	24	66	0	Pink and white.
47	Early Ohio	E. early	Good	330	0	264	0	66	0	"
48	Rough Coat Cup			325	36	220	0	105	36	"
49	Early Elkinah	Early	Good	316	48	237	36	79	12	"
50	Uncle Sam	Medium	"	312	24	228	48	83	36	White.
51	Nott's Peachblow	Late		312	24	220	0	92	24	Pale pink, red in eye.
52	Enormous	"	Good	308	0	255	12	52	48	White.
53	American Wonder	"	"	308	0	246	24	61	36	"
54	Wonderful	Medium		308	0	246	24	101	12	Yellowish.
55	Vick's No. 9			299	12	255	12	44	0	White.
56	State of Maine	Late	Good	299	12	242	0	57	12	"
57	Pingree	Early		290	24	224	24	66	0	"
58	General Gordon	"	Good	290	24	215	36	74	48	Pink.
59	Delaware	Medium	"	277	12	242	0	35	12	White.
60	Prolific Rose	"		272	48	211	12	61	36	Pink.
61	Dublin Prize			268	24	180	24	88	0	Yellowish.
62	Carman No. 3	Late	Good	264	0	215	36	48	24	White.
63	Early White Prize	Early	"	250	48	176	0	74	48	"
64	Country Gentleman	"		246	24	189	12	57	12	Pink and white.
65	Early Envoy	"		246	24	189	12	57	12	"
66	Irish Cobbler	"	Good	246	24	189	12	57	12	White.
67	Snowball	E. early		246	24	167	12	79	12	"
68	Maule's Thoroughbred	Early		233	12	189	12	44	0	Pink.
69	Seedling No. 7	Late		215	36	193	36	22	0	Bright pink.
70	Early St. George	Early	Good	215	36	140	48	74	48	Pink and white.
71	Cambridge Russet	Medium	"	206	48	162	48	44	0	White.
72	James Nugget			206	48	88	0	118	48	"
73	Bovee	E. early	Good	180	24	105	36	74	48	Pink and white.
74	Bliss Triumph	"	"	127	36	70	24	57	12	Red.
75	Early Andes	"	"	123	12	92	24	30	48	Pink.

ADDITIONAL VARIETIES OF POTATOES TESTED IN 1904.

The following varieties, some of which were sent for test, and including among their number some of the newer English sorts, were grown in smaller plots this year:—

Name of Variety.	Number of Sets Planted.	Total Yield Per Acre.		Yield Per Acre of Marketable.		Yield Per Acre of Unmarketable.		Colour.
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
Ashleaf Kidney Heber Rawlings, Forest, Ont.	33	545	36	448	48	96	48	White.
Dalmeny Beauty	33	519	12	440	..	79	12	"
White Albino	33	501	36	378	27	123	12	"
Pat's Choice	33	404	48	334	24	70	24	Bright pink, red eye.
Early Johnston	33	404	48	308	..	96	48	Pale pink.
Kaiser	33	352	..	264	..	88	..	White.
Woltman	33	352	..	255	12	96	48	Red.
Charles Fidler	33	343	12	290	24	52	48	White.
Early Sunlight	33	343	12	264	..	79	12	"
Daybreak	33	343	12	228	48	114	24	Pink.
Empress Queen	33	334	24	220	..	114	24	White.
Hibernia	33	334	24	184	48	149	36	Deep pink.
Northern Star	16	334	..	211	12	123	12	White.
Evergood	33	308	..	132	..	176	..	"

Spraying Potatoes for the Prevention of Blight and Rot.

Although it has been known for about seventeen years that spraying with Bordeaux mixture will prevent the blight and rot of the potato, only a small proportion of Canadian farmers spray even yet, although the loss is very great nearly every year. This year a comparative test was made between plots sprayed with Bordeaux mixture and Bug Death applied together; Bordeaux mixture and Paris green; Bordeaux mixture made with washing soda instead of lime, and Paris green; Bug Death; and Paris green. Sixteen varieties were used in this test, each occupying one row 33 feet long, the 16 varieties covering just 1-33 of an acre being the area devoted to each test. Only fifteen sorts are reported on, as in one plot one variety had an advantage over the others and it was not included. The soil on the whole was a uniform, rich sandy loam. The potatoes were kept thoroughly cultivated until the vines met and were sprayed five times, namely, on July 2, 13, 25, August 2, 27. The plots sprayed with the Bordeaux-Bug Death mixture received an extra spraying on June 22 with Bug Death dry alone. There were no rotten potatoes in the plot sprayed with the Bordeaux-Bug Death mixture. The potatoes were planted on May 28, and dug on October 6.

TABLE I.—Experiments in Spraying to prevent Blight and Rot of Potatoes.

Name of Varieties.	Yield per acre, marketable potatoes — Bordeaux mixture and Bug Death.		Yield per acre, marketable potatoes — Bordeaux mixture and Paris Green.		Yield per acre, marketable potatoes — Soda Bordeaux and Paris Green.		Yield per acre, marketable potatoes — Bug Death.		Yield per acre, marketable potatoes — Paris Green.		Yield per acre, rotten potatoes — Bordeaux mixture and Paris Green.		Yield per acre, rotten potatoes — Soda Bordeaux.		Yield per acre, rotten potatoes — Bug Death.		Yield per acre, rotten potatoes Paris Green.	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Main Crop Varieties.																		
Sir Walter Raleigh	576	24	488	24	391	36	277	12	281	36	..	..	..	..				
Rural Blush	611	36	580	48	413	36	409	24	334	24	..	..	..	..	35	12	..	..
Late Puritan	484	..	352	..	356	24	422	24	308	..	..	..	..	..	..	..	..	..
Dreer's Standard	308	..	215	36	268	24	167	12	206	48	..	..	..	..	70	24	..	..
Enormous	382	48	440	..	387	12	92	24	360	48	..	..	..	..	136	24	44	..
Cambridge Russet	325	36	347	36	290	24	330	..	237	36	..	..	..	..	..	..	..	..
I. X. L	563	12	444	24	299	12	404	48	360	48	..	..	..	..	48	24	4	24
Burnaby Mammoth	475	12	365	12	378	24	440	..	396	..	..	..	..	..	13	12	..	..
Swiss Snowflake	426	48	431	12	426	48	360	48	400	24	..	..	..	..	..	..	..	..
Average	461	31	407	15	356	53	321	41	320	43	..	..	..	..	33	44	5	23
Early Varieties.																		
Rochester Rose	426	48	422	24	431	12	347	36	360	48	..	..	.	..	83	36	.	.
Early Rose	303	36	382	48	404	48	457	36	426	48	..	..	4	24	.	..	..	..
Lee's Favourite	232	12	250	48	264	..	246	24	176	..	..	..	..	..	35	12	..	..
Early Ohio	343	12	255	12	343	12	189	12	233	13	..	..	..	..	48	24	..	..
Irish Cobbler	299	12	290	24	250	48	356	24	299	12	..	..	..	..	..	..	..	..
Flemish Beauty	413	36	387	12	299	24	167	12	259	36	..	..	..	..	79	12	8	48
Average	336	36	331	28	330	44	294	4	292	36	..	..		—44	41	4	1	28
Average of all varieties, 1904	399	3	369	21	343	48	307	52	306	39	..	..		—22	37	24	3	25
Average of all varieties, 1902	..	..	310	12	..	..	251	6	189	54	15	18	..	..	32	24	34	28
Average of all varieties, 1901	..	..	333	43	..	..	..	..	233	11	..	..	..	..	..	..	28	44
Average for 3 years	..	..	337	45	..	..	..	..	243	15	..	..	..	..	..	..	..	..

In the above table the fifteen varieties were divided and the results from spraying the main crop varieties averaged and kept separately from the early ones. This was to show which were influenced most by spraying. It will be seen that the main crop varieties were much more influenced this year than the early, the average greatest increase of the main crop varieties being at the rate of 140 bushels 48 pounds per acre, and of early varieties only 44 bushels per acre, or an average of both of 92 bushels 24 pounds per acre. This great difference was probably due to the fact that this year the blight did not appear until well on in August, when the crop of the early varieties was well advanced. Taking the average of the years 1901, 1902 and 1904, the increase in crop from the use of Bordeaux mixture has been 94 bushels 30 pounds per acre.

In 1902 there was an average increase from the use of Bug Death over Paris Green of 61 bushels per acre, but in 1904 there was practically no increase. There was more rot in the plots treated with Bug Death in 1904 than in those where Paris Green was used, which is difficult to account for as the soil was of a uniform character. In 1902 the amount of rot was about the same in both plots.

TABLE II.

Mixtures used, 1904.	Cost of Materials and Application per acre.		Yield per acre Marketable Potatoes, average of Ex varieties.		Increase in Crop per acre over Potatoes Sprayed with Paris Green only.		Increase in value of Crop per acre at 40 cents per bushel.	Net Loss or Gain per acre after deducting cost of materials and application.
			Bush.	Lbs.	Bush.	Lbs.	$ cts.	$ cts.
Plot 1.—Bordeaux Mixture and Bug Death Formula—6 lbs. bluestone, 4 lbs. lime, 40 galls. water, 12 oz. Bug Death..... Sprayed July 13, 25, Aug. 2, 27..... $22\frac{4}{16}$ lbs. per acre dry, June 22 ..... 33 lbs. per acre dry, July 2.....	99 lbs. bluestone at 6 cts.....	$ 5 94						
	$1\frac{3}{4}$ bush. lime at 22 cts	0 39						
	$154\frac{11}{16}$ lbs. Bug Death at 7 cts.....	10 83						
	Total cost	$ 17 06	339	3	92	24	36 96	21 86 gain.
Plot 2.—Bordeaux Mixture and Paris Green— Formula—6 lbs. bluestone, 4 lbs. lime, 8 oz. Paris Green, 40 galls. water ..... Sprayed July 2, 13, 25, Aug. 2, 27..	$118\frac{3}{8}$ lbs. bluestone at 6 cts.....	$ 7 13						
	$9\frac{7}{16}$ lbs. Paris green at 19 cts	1 88						
	$1\frac{3}{4}$ bush. lime at 22 cts.....	0 35						
	Total cost	$ 9 36	369	21	62	12	25 08	17 68 gain
Plot 3. Soda Bordeaux and Paris Green— Formula—6 lbs. bluestone, $7\frac{1}{2}$ lbs. washing soda, 8 oz. Paris green, 40 galls. water.....	$118\frac{3}{8}$ lbs. bluestone at 6 cts	$ 7 13						
	$148\frac{7}{8}$ lbs. washing soda at 2 cts.....	2 97						
	$9\frac{7}{16}$ lbs. Paris green at 19 cts.....	1 88						
	Total cost	$ 11 98	313	18	37	9	14 86	4 44 gain.
Plot 4. Bug Death— Formula—$22\frac{4}{16}$ lbs. per acre, June 22..... 33 lbs. per acre, July 2..... $24\frac{7}{8}$ lbs. per acre, July 13, 22, Aug. 2, 27.	$80\frac{7}{16}$ lbs. Bug Death at 7 cts.....	$ 5 63	307	32	1	13	0 49	3 18 loss.
Plot 5. Paris Green— Formula—8 oz. Paris green to 40 galls. water	$10\frac{5}{16}$ lbs. Paris green at 19 cts.....	$ 1 96	306	39	.....	.....	.....	.....

The foregoing table shows that the Bordeaux-Bug Death mixture used in the manner described gave a net increase of $21.86 per acre in the value of the potato crop, a difference in favour of this combination over ordinary Bordeaux mixture and Paris green of $4.18. The cost of applying the different mixtures in this test is not given in the table, as the expense of spraying small plots is larger proportionately than it would be by the acre. The cost of applying the Bordeaux-Bug Death mixture was greater than the Bordeaux mixture and Paris green on account of the extra spraying on June 22, hence the difference in favour of the Bordeaux-mixture and Bug Death is really less than the table indicates, the estimated cost per acre of applying the Bug Death dry on June 22, being $1.10. The probable reason of the greater increase of yield from the Bordeaux-Bug Death mixture is that the Bug Death adheres well to the foliage and when applied with Bordeaux mixture would cause it to adhere better also.

TOMATOES—TEST OF VARIETIES.

The season of 1904 was a very unfavourable one for tomatoes, owing to so much cool, cloudy weather, and there was only about one-third of the usual crop. There were 62 varieties tested. The seed was sown in the hot-beds on March 31, and the plants pricked out into strawberry boxes on May 2, and kept in a cold frame until June 6, when they were planted in the open air. They were planted four feet apart each way, and five plants of each variety were used. The soil was a light sandy loam which had been manured the previous season. The soil was kept cultivated until the plants covered the ground. The Sparks' Earliana which has been among the best early ripening kinds for the past four years, did not do quite so well this year, although it is still considered the best early tomato tested, being smoother than other kinds. If the Nolte's Earliest were a little smoother it would compare very favourably with Sparks' Earliana, and this year has yielded much better.

TOMATOES—TWELVE BEST YIELDING VARIETIES, 1904.

Name of Variety.	Date of First Ripe Fruit.	Yield of Ripe Fruit to Aug. 13, 1904.		Total Yield of Ripe Fruit, all pickings—6 Plants.		Total Yield of Ripe Fruit per Plant.		Remarks.
		Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	
Early Bird	Aug	4	1	..	69	12	13	15	Below medium size, smooth, purplish pink.
Nolte's Earliest	July	22	4	2	58	2	11	10	Medium size, wrinkled, scarlet.
Democrat	Aug.	1	..	8	50	..	10	..	Medium size, wrinkled, purplish pink.
Turner's Hybrid	"	4	1	8	45	12	9	2	Large, smooth to slightly wrinkled, purplish pink.
Extra Early Red	July	26	1	12	44	8	8	14	Below medium size, smooth, scarlet.
Acme	Aug.	3	4	..	37	8	7	8	Medium size, smooth, purplish pink.
Canada Victor	July	26	..	12	36	..	7	3	Medium size, wrinkled, scarlet.
Rosedale	"	26	2	15	35	3	7	1	Medium size, scarlet.
Thorburn's Long Keeper	Aug.	4	1	..	34	4	6	14	Below medium size, regular, smooth, purplish pink.
Sparks' Earliana	July	29	1	8	33	..	6	10	Medium size, half wrinkled to smooth, scarlet.
Bond's Early Minnesota	"	29	1	12	32	8	6	8	Below medium size, smooth, purplish pink.
Thorburn's Earliest	Aug.	1	1	8	32	8	6	8	Medium size, wrinkled, scarlet.

TOMATOES—SIX EARLIEST VARIETIES, 1904.

Maule's Earliest	July	27	5	5	26	9	5	5	Medium size, wrinkled, scarlet.
Nolte's Earliest	"	22	4	2	58	2	11	10	" "
Early Leader	"	26	3	15½	29	15½	6	..	Below medium size, half wrinkled, scarlet.
Chalk's Early Jewel		24	3	8	19	2	3	13	Medium size, smooth, scarlet.
New Extra Early	"	27	3	4	25	4	5	1	
Conqueror	"	27	2	14	19	6	3	14	Medium size, wrinkled to smooth, scarlet.

The varieties of tomatoes which have averaged best for a number of years and which are recommended for general planting are:—*Early*, Sparks' Earliana. *Main Crop*, Brinton's Best, Trophy, Matchless (scarlet), and Burpee's Climax, and Autocrat (purplish pink).

An experiment with a certain method of pruning tomatoes was tried this year with gratifying results. When the plants in the hot-beds had six strong leaves developed, which was on May 23, the tops were nipped off and the plants given more room, being placed 5½ inches apart. The object of pinching off the top of the plant was to cause new shoots to develop at the axils of the leaves in order to have six branches bearing early tomatoes instead of the one cluster usually found on the top of the plant. These were planted out on June 6, alongside other plants unpruned. On June 22, half of the pruned plants were again pruned, all laterals being taken out and the six main branches only being left, the other plants were left to grow at will, and it was found that they produced the most ripe fruit, though not the largest early crop. This system of pruning is very promising. The further advanced the axillary shoots are when the plants are set out the larger the early crop is likely to be. In the experiment this year the plants were not started nearly early enough to get the best results. The experiment was suggested by Mr. J. S. Littooy, Everett, Washington Territory, who has been pruning tomatoes in this way for some time in Washington, with gratifying results, where they have difficulty in ripening tomatoes.

TOMATOES—EXPERIMENT IN PRUNING.

Name of Variety.	Date of First Ripe Fruit.	Ripe Fruit First Three Pickings.	Total Yield of Ripe Fruit.	
		Lbs.	Lbs.	Oz.
Spark's Earliana—				
Unpruned	July 29.	9	84	
Pruned once	Aug. 13	6	137	10
Pruned twice	" 12	18	132	13
Matchless—				
Unpruned	Aug. 4		29	
Pruned once	" 29		73	8
Pruned twice	" 29		62	

TOBACCO—TEST OF VARIETIES.

Tobacco is tested every year at the Central Experimental Farm on account of the importance of the crop. This year fifty-one varieties were grown, or at least tobacco under fifty-one different names, as it is probable that a number of them were synonyms. Twenty plants of each variety were tested, but seven kinds were grown on larger areas. The season was favourable to the tobacco crop, as although it was cool the plants grew well, and by September 9, when they were cut, the plants were nearly as mature on the whole as they usually get here. The seed was sown in hot-beds on April 4, and the plants pricked out into a cold frame on May 21, and planted in the field on June 6, in rows 3 x 3½ feet apart.

Name of Variety.	Condition when cut.	Yield of dry leaves from 20 plants.		Yield of dry leaves per acre.	
		Lbs.	Oz.	Lbs.	Oz.
Connecticut Seed Leaf	Nearly mature	13	12	2,852	2
Pennsylvania Seed Leaf	"	8	9	1,776	2
Cuban Seed Leaf	"	7	12	1,607	9
Havana Seed Leaf	"	7	9	1,568	11
Lancaster Co. Broad Leaf	"	7	7	1,542	12
Bonanza	"	7	4	1,503	14
Lack's	"	7	1	1,465	0
Gold Leaf	"	6	13	1,413	0
Honduras	"	6	5	1,309	6
Flannagan	"	6	3	1,283	7
White Burley	"	6	0	1,244	9
Warne	"	5	14¾	1,228	6
Maryland	Mature	5	13	1,205	11
Kentucky Burley	Nearly mature	5	12	1,192	11
Big Havana	"	5	10	1,166	12
Oronoka White Stem	"	5	10	1,166	12
Sumatra	"	5	9	1,153	13
Sterling	Mature	5	8	1,140	14
Comstock Spanish	Nearly mature	5	8	1,140	14
Bradley's Broad Leaf	"	5	8	1,140	14
Zimmer's Spanish	"	5	7	1,127	14
N. C. Bright Yellow	"	5	7	1,127	14
Conqueror	"	5	3	1,076	0
Hester	"	5	1	1,050	2
Persian Muscatelle	Mature	5	1	1,050	2
Small Red Canadian	"	5	1	1,050	2
Gold Finder	Nearly mature	5	0	1,037	2
Virginia One Sucker	Mature	4	15½	1,030	11
Virginia Oak Hill	Nearly mature	4	15	1,024	3
Safrano	Mature	4	13½	1,004	12
Yellow Pryor	Nearly mature	4	13	998	4
Large Havana	"	4	12	985	5
Little Oronoka	"	4	6	907	8
Yellow Mammoth	"	4	5	894	9
Oronoka Yellow	"	4	3	868	10
Hyco	"	4	1	842	11
Long Leaf Gooch	Mature	4	0	829	12
Sweet Oronoka	"	3	9	738	15
Granville Co. Yellow	Nearly mature	3	9	738	15
Primus	"	3	8½	732	7
Eastern Pride	"	3	8	726	0
Improved White Burley	"	3	7	713	0
Choice Havana	"	3	4	674	2
Turkish	Mature	3	3	661	3
Havana	"	3	2	648	3
Evans	"	3	0	622	5
Climax	Nearly mature	2	15½	615	13
Persian Rose	Mature	2	11	557	7
Small Havana		2	9	531	8
Cannelle		2	5	479	11
Vuelta de Abajo		2	5	479	11
Porto Rico		2	4	466	11
Cannelle Good Canadian		2	3	453	12

FOREST BELTS.

The forest belts at the Central Experimental Farm extend along its northern and western boundaries, the belt on the western boundary being 165 feet wide, and that on the northern boundary 65 feet wide. Their total length is nearly 1¾ miles. The number of trees growing in these belts, including those in a separate plantation of evergreens, is about 23,100.

One of the principal objects for which the forest belts were planted was to obtain information relating to the growth of the best timber trees, when grown on different soils at different distances apart, in blocks of single species, and in mixed plantations.

The distances chosen at first were 5 by 5 ft., 5 by 10 ft., and 10 by 10 ft. apart. In addition to obtaining information on the growth of the trees, another object of planting the belts was to find what influence they would have on the crops in the adjoining fields, both favourable and unfavourable. It was expected also that these belts would add much to the appearance of the landscape. It was hoped that other useful information regarding timber trees would also be obtained.

The first planting was done in the autumn of 1887, just seventeen years ago, and the rapid growth which most of the trees have made should be some inducement to farmers and others to plant trees.

Although the soil was not in all cases suitable for the trees which were planted in it, being very poor in some places and badly drained, at first in others, these various conditions have enabled us to note the kinds of soils which certain species will thrive in or those in which they will not do well.

It has been found that the trees which were planted 5 by 5 feet apart, the closest distance used at first, are making the best trees from a forestry standpoint, as the side branches are killed much sooner. The trees planted 5 by 5 feet apart are more protected from storms than those further apart, and hence the tops are less injured. They are also a little taller in most cases, but are not so great in diameter as those 10 by 10 feet apart. During the first years of growth there is a great advantage in having the trees close, as in order to get thrifty growth the soil should not become hard, nor should the trees be almost smothered with weeds or grass, and to get these good conditions it is necessary to cultivate at first, and the further the trees are apart the longer one will have to cultivate, thus making the expense greater.

Until the last three years the trees in the mixed plantation were making the most satisfactory growth, and are yet making better growth than some of the clumps composed of single species, but the rapid growing kinds are developing so fast in the mixed belt that they are overshadowing some of the more valuable trees, and those which cannot endure much shade are being killed. To some extent this overshadowing is prevented by shearing the side branches and letting in more light. In nature, the proper proportion of fast and slow growing, shade-enduring and light-needing trees is gradually adjusted as the trees develop, but in artificial planting, it is very difficult to arrange them in proper proportion where a number of species are used. The fewer kinds that are employed the easier it becomes.

In some of the clumps of single species the disadvantage of not having two or more kinds mixed is quite as apparent as the disadvantage of having so many kinds mixed in the mixed belt. Ash, Butternut, Black Walnut, and Elm, which have thin foliage, do not kill the sod, and the growth on this account is checked. If other heavy foliaged kinds, such as Larch, Spruce, Pine, or Box Elder had been mixed with these the results would have been, almost certainly, much better.

Beginning in 1899 and continuing at intervals since, some plantations have been made with trees and shrubs at much closer distances apart, the largest proportion being shrubs which are used for under-growth and which grow rapidly at first, but do not reach a great height. In these plantings the trees and shrubs are but 2½ feet apart. It is too soon yet to report fully on this experiment, but the results already obtained go to show that this method, if properly carried out, has some important advantages over wider planting, one of the principal being the saving of cultivation. It is possible that 3 feet apart would be as satisfactory or more satisfactory a distance than 2½ feet. The chief shrubs used as undergrowth were Rosemary Willow (*Salix rosmarinifolia*), Alder Buckthorn (*Rhamnus Frangula*), Sand Cherry (*Prunus pumila*), and Nine-bark (*Neillia opulifolia*). The last has been found the most satisfactory, as it grows rapidly even in sod and has dense foliage.

Every year measurements are taken in the forest belts at the Central Experimental Farm, both of the annual growth in height and in diameter, and tables are published from time to time in this report, the last one appearing in 1901. In the following table will be found the measurements of the principal species of trees in the belts up to this autumn. In most cases the published figures are the averages of three average trees, but in a few instances six trees are averaged.

GROWTH of Trees in the Forest Belts at the Central Experimental Farm.

Name of Species.	Character of Soil.	When Planted.	Distance Apart.	Age or Height when Planted.	Average Height, 1900.		Average Height, 1901.		Average Height, 1902.		Average Height, 1903.		Average Height, 1904.		Average Diameter 4' 6" from ground, 1904.
			Feet.	Years.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	in.
Black Walnut—Juglans nigra	Low sandy loam	1888	5 × 5	1	11	6	12	..	12	9	13	..	13	6	2¼
" "	"	1888	10 × 10	1	7	..	7	11	8	5	8	11	9	3	1⅝
" "	Sandy loam with small stones	1889	5 × 5	2	16	4	17	7	18	8	19	6	20	1	3¼
" "	" "	1889	10 × 10	2	12	3	13	4	14	2	14	7	15	2	3⅝
" "	Clay loam	1888	10 × 5	1	14	1	15	4	16	2	16	10	17	8	3¼
Butternut—Juglans cinerea	Low sandy loam	1889	5 × 5	1	11	7	11	11	12	..	12	..	12	2	2⅛
" "	"	1888	10 × 10	1	10	1	10	6	10	6	10	8	10	10	1¾
Silver-leaved Maple—Acer dasycarpum	Light sandy loam	1889	5 × 5	3	27	3	28	..	28	5	28	7	28	10	2¾
" "	"	1889	10 × 10	3	24	8	25	1	25	8	25	5	25	8	4⅝
European White Birch—Betula alba	"	1889	5 × 5	3	34	8	35	9	Dead.		..	..	..	..	..
" "	"	1889	10 × 10	3	37	3	38	7	39	5	Dead.		..	..	..
Canoe Birch—Betula papyrifera	"	1889	5 × 5	3	31	..	32	7	33	1	33	5	34	3	4
" "	"	1889	10 × 10	3	31	1	32	8	34	1	34	9	35	1	5½
Yellow Birch—Betula lutea	"	1889	5 × 5	3	21	10	23	..	23	9	24	1	24	2	3
" "	"	1889	10 × 10	3	21	8	23	6	24	3	24	9	25	6	4⅜
White Elm—Ulmus americana	Sandy loam	1889	5 × 5	3	17	3	18	1	18	11	19	9	20	2	2½
" "	"	1889	10 × 10	3	18	9	19	8	20	9	21	4	22	4	4⅛
Black Ash—Fraxinus sambucifolia	Black muck	1889	5 × 5	2	18	2	18	10	19	4	19	9	20	5	2½
" "	Low sandy loam	1889	10 × 10	2	11	11	12	5	N'rly dead		..	..	..	..	..
Green Ash—Fraxinus viridis	Black muck	1889	5 × 5	3	20	10	22	8	24	..	25	1	26	10	3¼
" "	Low sandy loam	1889	10 × 10	3	17	2	18	5	19	8	21	..	21	6	3¾
Red Ash—Fraxinus pubescens	Black muck	1889	5 × 5	2	22	8	24	4	26	..	26	11	28	8	3⅞
" "	Light sandy loam	1889	10 × 10	2	17	2	18	10	20	3	21	4	22	11	3⅞
White Ash—Fraxinus americana	Black muck	1889	5 × 5	3	24	1	24	8	25	7	26	1	26	7	2⅞
" "	Light sandy loam	1889	10 × 10	3	23	10	25	9	26	9	27	7	28	..	3⅞
Black Cherry—Prunus serotina	Light sandy loam and gravel	1889	5 × 5	3	18	11	19	11	21	2	22	1	23	2	2⅞
" "	" "	1889	10 × 10	3	24	4	26	7	29	..	30	3	32	1	4⅞
Box Elder—Acer Negundo	Light sandy loam	1889	5 × 5	2	25	2	25	7	25	8	26	1	26	6	3¼
				in.											
Scotch Pine—Pinus sylvestris	Sandy loam with gravel	1888	5 × 5	18	23	6	24	9	26	9	28	..	28	3	4¼
" "	" "	1888	10 × 10	18	21	2	22	7	22	9	24	2	24	4	5⅞
" "	Low sandy loam with gravel	1888	5 × 5	18	22	9	24	2	25	8	26	10	27	9	3⅞
" "	Low sandy loam	1888	10 × 10	18	21	10	23	..	24	3	25	5	26	6	5⅞
" "	Light sandy loam	1888	10 × 5	18	24	5	25	9	27	2	28	7	29	4	8¾
" "	Clay loam	1888	10 × 5	18	20	9	22	2	22	10	23	7	24	8	6
" "	Light sandy loam and gravel	1888	10 × 5	18	23	5	25	2	25	7	26	11	27	9	6½
" "	" "	1887	3 × 3	9	24	4	26	..	27	..	28	4	29	4	3⅝

GROWTH of Trees in the Forest Belts at the Central Experimental Farm *Concluded.*

Name of Species.	Character of Soil.	When Planted.	Distance Apart.	Age or Height when Planted.	Average Height, 1900.	Average Height, 1901.	Average Height, 1902.	Average Height, 1903.	Average Height, 1904.	Diameter 4' 6" from ground, 1904.
			Feet.	in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	In.
Austrian Pine—Pinus austriaca	Light sandy loam	1889	5 × 5	18	17 10	19 9	21 9	23 4	24 10	4
" "	"	1889	10 × 10	18	18 1	19 3	20 10	22 4	23 6	6
" "	"	1888	10 × 5	15	17 5	19 7	21 1	22 2	23 3	5
" "	Clay loam	1888	10 × 5	15	17 .	18 11	20 10	22 4	23 3	5
" "	Light sandy loam and gravel	1888	10 × 5	15	19 6	21 6	23 1	24 5	25 3	6
" "	" "	1887	3 × 3	15	18 .	19 8	20 11	22 2	23 3	5
White Spruce—Picea alba	Light sandy loam	1889	5 × 5	15	13 2	14 2	15 1	15 5	16 5	3
" "	"	1889	10 × 10	15	14 .	14 10	15 6	16 6	17 8	3
Norway Spruce—Picea excelsa	"	1889	5 × 5	18	15 11	17 2	18 7	19 1	20 3	3
" "	"	1889	10 × 10	18	20 1	22 .	23 3	24 9	25 5	4
" "	"	1888	10 × 5	15	23 4	25 7	27 4	29 3	30 4	5
" "	Clay loam	1888	10 × 5	15	23 11	25 11	27 7	29 11	30 11	6
American Arbor vitæ—Thuya occidentalis	Low sandy loam and black muck	1889	5 × 5	18	15 .	16 5	17 2	18 2	18 11	3
" "	Low sandy loam	1889	10 10	18	13 9	14 10	15 6	16 1	17 3	3
				feet.						
European Larch—Larix europea	"	1888	5 × 5	2	26 10	28 .	28 11	30 4	31 10	1
" "	"	1888	10 × 10	2	25 6	28 5	28 9	29 7	31 2	5
White Pine—Pinus Strobus	Light sandy loam with gravel	1889	5 × 5	8 to 10 in.	22 9	24 6	26 1	26 10	28 11	4
" "	" "	1889	10 10	8 to 10 in.	21 .	22 7	24 5	26 .	27 9	6

NOTE: The low sandy soil in which the Black Walnut and Butternut are growing appears quite unsuitable and the trees are almost at a standstill. The light sandy soil in which some of the White Spruce are is not very suitable nor is the sandy loam where the White Elm are growing. These trees have all made much better growth in other soils.

ARBORETUM AND BOTANIC GARDEN.

Notwithstanding the severe winter of 1903-4 there were not many more trees and shrubs winter killed than usual, owing to the deep snow which protected the roots and the lower part of the trunk, but the killing back of the trees was severer than in other years. Further additions were made to the collection of trees and shrubs and to the herbaceous perennials. Of trees and shrubs 343 specimens representing 291 species and varieties were added, making the total number of species and varieties of trees and shrubs alive 3,132 when winter set in. The addition to the collection of herbaceous perennials was not large this year, but there are over 400 species and varieties available for planting next spring. A bulletin on herbaceous perennials is being prepared.

In the following table will be found a list of the genera of trees and shrubs in the Arboretum, with the number of species and varieties of each genus alive in the autumn of 1904.

No. of species and varieties alive in Arboretum, 1904.	Name of Genus.
4	Acanthopanax.
22	Acer—Maple.
2	Actinidia.
38	Æsculus—Horse Chestnut—Buckeye.
3	Akebia.
33	Alnus—Alder.
8	Amelanchier—Juneberry.
17	Amorpha—False Indigo.
1	Andrachne.
3	Andromeda.
1	Aphananthe.
5	Aralia.
1	Aralidium.
1	Arctostaphylos.
2	Aristolochia—Birthwort.
5	Artemisia—Southernwood.
1	Asimina—North American Papaw.
1	Atraphaxis.
1	Baccharis—Groundsel-tree.
75	Berberis—Barberry.
1	Berchemia.
42	Betula—Birch.
1	Broussonetia—Paper Mulberry.
4	Buddleia.
1	Bupleurum.
1	Bruckenthalia.
1	Buxus—Box.
1	Caesalpina.
1	Calluna—Heather.
2	Calycanthus—Carolina Allspice.
26	Caragana—Siberian Pea Tree.
14	Carpinus—Hornbeam.
1	Cassandra.
3	Carya—Hickory.
5	Castanea—Chestnut.
11	Catalpa.
4	Ceanothus—New Jersey Tea.
3	Celastrus—Shrubby Bitter-Sweet.
5	Celtis—Hackberry.
1	Cephalanthus—Button Bush.
1	Cercidiphyllum—Katsura Tree.
1	Cercis—Redbud.
1	Cercocarpus.
1	Chionanthus—Fringe-Tree.
2	Cladrastis—Yellow-wood.
50	Clematis—Virgin's Bower.
4	Clethra—Sweet Pepperbush.
1	Cocculus.
10	Colutea.
38	Cornus—Dogwood.
16	Corylus—Hazel-nut, Filbert.
18	Cotoneaster.
116	Crataegus—Hawthorn.
26	Cytisus—Broom.
4	Daphne.
1	Decumaria.
29	Deutzia.
31	Diervilla—Weigela.
2	Diospyros—Persimmon.
9	Elaeagnus—Olive.
1	Ephedra.
5	Erica—Heath.
29	Euonymus—Spindle Tree.
1	Exochorda.
7	Fagus—Beech.
1	Fatsia.
1	Fendlera.
6	Fontanesia.
1	Forestiera.
10	Forsythia—Golden Bell.
86	Fraxinus—Ash.
6	Genista—Green-weed.
1	Grewia.
10	Gleditschia—Honey Locust.
2	Gymnocladus—Kentucky Coffee Tree.
2	Halesia—Silver-bell Tree.
2	Halimodendron.
2	Hamamelis—Witch Hazel.
1	Hedysarum.
2	Hippophae—Sea Buckthorn.
8	Hydrangea.
9	Hypericum—St. John's Wort.
6	Ilex—Holly.
1	Itea.
1	Indigofera.
1	Jamesia.
19	Juglans—Walnut, Butternut.
1	Kalmia—American Laurel.
2	Kerria.
1	Koelreuteria.

No. of species and varieties alive in Arboretum, 1904.	Name of Genus.
1	Laburnum.
1	Ledum—Labrador Tea.
3	Lespedeza.
2	Leucothoe.
24	Ligustrum—Privet.
1	Lindera—Wild Allspice.
2	Liriodendron—Tulip Tree.
107	Lonicera—Honeysuckle.
9	Lycium—Matrimony Vine.
1	Lyonia.
3	Magnolia.
1	Menispermum—Moonseed.
14	Morus—Mulberry.
5	Myrica—Bayberry.
1	Nandina.
2	Myricaria.
1	Neillia—Ninebark.
1	Nemopanthus—Mountain Holly.
1	Neviusia.
1	Nuttallia.
1	Nyssa—Pepperidge—Sour Gum.
2	Ostrya—Hop Hornbeam—Iron-wood.
1	Ononis.
1	Ostryopsis.
1	Oxydendron—Sorrel Tree—Sour Wood.
1	Pachysandra.
2	Paeonia—Paony.
1	Paliurus—Christ Thorn.
1	Parrotia.
1	Peraphyllum.
1	Periploca.
3	Phellodendron.
62	Philadelphus—Mock Orange—Syringa.
5	Photinia.
1	Pirrasma.
9	Platanus—Plane Tree—Buttonwood.
51	Populus—Poplar.
5	Potentilla—Cinque-foil.
138	Prunus—Almond, Peach, Apricot Plum, Cherry.
8	Ptelea—Wafer Ash.
3	Pterocarya.
1	Pterostyrax.
217	Pyrus—Pear, Apple, Mountain Ash, Quince, Medlar.
98	Quercus—Oak.
27	Rhamnus—Buckthorn.
6	Rhododendron.
1	Rhodotypos.
14	Rhus—Sumach.
57	Ribes—Currant, Gooseberry.
26	Robinia—Locust-tree.
82	Rosa—Rose.
36	Rubus—Raspberry, Blackberry, Dewberry
157	Salix—Willow.
41	Sambucus—Elder.
1	Schizandra.
1	Securinega.
6	Sophora.
85	Spiræa—Meadow-Sweet.
5	Staphylea—Bladder-Nut.
2	Stephanandra.
2	Styrax.
13	Symphoricarpus—Snowberry.
1	Symplocos.
102	Syringa—Lilac.
8	Tamarix—Tamarisk.
2	Tecoma—Trumpet Flower.
37	Tilia—Linden, Basswood.
92	Ulmus—Elm.
2	Vaccinium—Cranberry, Blueberry, Bilberry, Huckleberry.
29	Viburnum—Arrow-wood.
1	Vitex.
32	Vitis—Grape, Virginian Creeper, Ivy.
9	Wistaria.
1	Xanthorrhiza—Shrub—Yellow-root.
1	Xanthoxylum—Prickly Ash.
4	Yucca.
4	Zelkowa.
	Coniffes.
36	Abies—Fir.
2	Cedrus—Cedar.
40	Cupressus—Cypress.
4	Ginkgo—Maiden-hair Tree.
66	Juniperus—Juniper.
7	Larix—Larch—Tamarack.
75	Picea—Spruce.
45	Pinus—Pine.
1	Pseudolarix.
3	Pseudotsuga.
2	Taxodium,—Bald Cypress.
12	Taxus—Yew.
67	Thuya—Arbor Vitæ.
5	Tsuga—Hemlock.
3,132	Total number of species and varieties alive autumn of 1904.
180	Genera.

REPORT OF THE CHEMIST.

(Frank T. Shutt, M.A., F.I.C., F.S.C., F.R.S.C.)

Ottawa, December 1, 1904.

Dr. Wm. Saunders,
Director, Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit herewith the eighteenth annual report of the Chemical Division of the Experimental Farms.

Though much of a new and interesting character will be found in the results here presented, the investigations undertaken during the past season have for the most part been similar in nature to those of former years. More or less assistance has been rendered in all the branches of agriculture and, as far as possible, the more important problems affecting the farming interests of the various provinces of the Dominion have received attention and study.

In addition to the work here recorded, we have examind a large number of samples of an agricultural nature received from farmers.

Help also of a direct character has been given the individual through correspondence—an important branch of the work of the division.

Addresses have been delivered at several of the larger agricultural conventions in Ontario and Quebec, the following titles indicating the character of the matters discussed:—

'The Economic Maintenance of Soil Fertility.'
'The Importance of Clover as a Source of Humus and Nitrogen.'
'The Control of Soil Moisture in Orchards.'
'The "Cover" Crop and Cultivation; their Relative Importance in the Management of Orchard Soils.'
'The composition of Concentrated Feed Stuffs as sold in Canada.'
'The Factors which Control the Moisture Content of Butter.'
'The Changes in Honey on Storage in a Damp Atmosphere.'

Tour in British Columbia.—At the special request of the Provincial Government, two months were spent in visiting the more important agricultural areas of British Columbia. An account of this interesting and instructive tour will be found at the conclusion of the accompanying report.

Soils.—A number of virgin soils from British Columbia have been submitted to careful analysis. These include representative samples from Kingcome Inlet, Cape Scott, Balfour and Kualt. A soil from New Liskeard (New Ontario) and one from the Peace River district have also been examined and are now reported upon.

In addition to these, we have received a large number of soils from farmers all over the Dominion. These have not received complete analysis—and consequently do not find a place in this report. From a preliminary examination and the determination of certain elements of fertility we have endeavoured to draw conclusions regarding the rational treatment of these soils, and these particulars we trust have proved of value to those sending the soils.

Control of Soil Moisture.—Further experiments have been conducted, in the orchards of the experimental farms at Ottawa and Nappan. The results are well in accord with those of our former researches and at the same time serve to emphasize certain important features in soil management which had not hitherto been investigated.

Fodders and Feeding Stuffs.—During the past three seasons an investigation has been carried on with the object of determining the amount of dry matter, protein, &c., as produced per acre by Indian corn sown in hills and drills, respectively. This work is now reported upon.

Analysis of Rape ensilage and ensilage of mixed Rape and Corn are given and the values of these new succulent fodders discussed.

A considerable number of milling products, meat meals, and stock foods have been examined during the past year. These analyses now constitute an important branch of our work, owing to the many new products and condimental foods being constantly put upon the market.

Materials of Fertilizing Value.—These include samples of wood-ashes, ashes from muck, &c., &c., received from farmers in various parts of Canada. The results obtained on the more important of these are here given and briefly discussed.

Sugar Beets.—We have determined the amounts of plant food withdrawn from the soil by this crop as grown for factory purposes. The results show the nitrogen, phosphoric acid, potash, and lime contained in the roots, crowns and leaves, respectively, in the beet at three stages of growth, and may serve as a guide in the rational manuring of this crop.

The richness and purity of the varieties, Vilmorins' Improved, Klein Wanzleben and Très Riche—probably the three best for factory purposes—as grown on the several Experimental Farms of the Dominion, have been ascertained and tabulated.

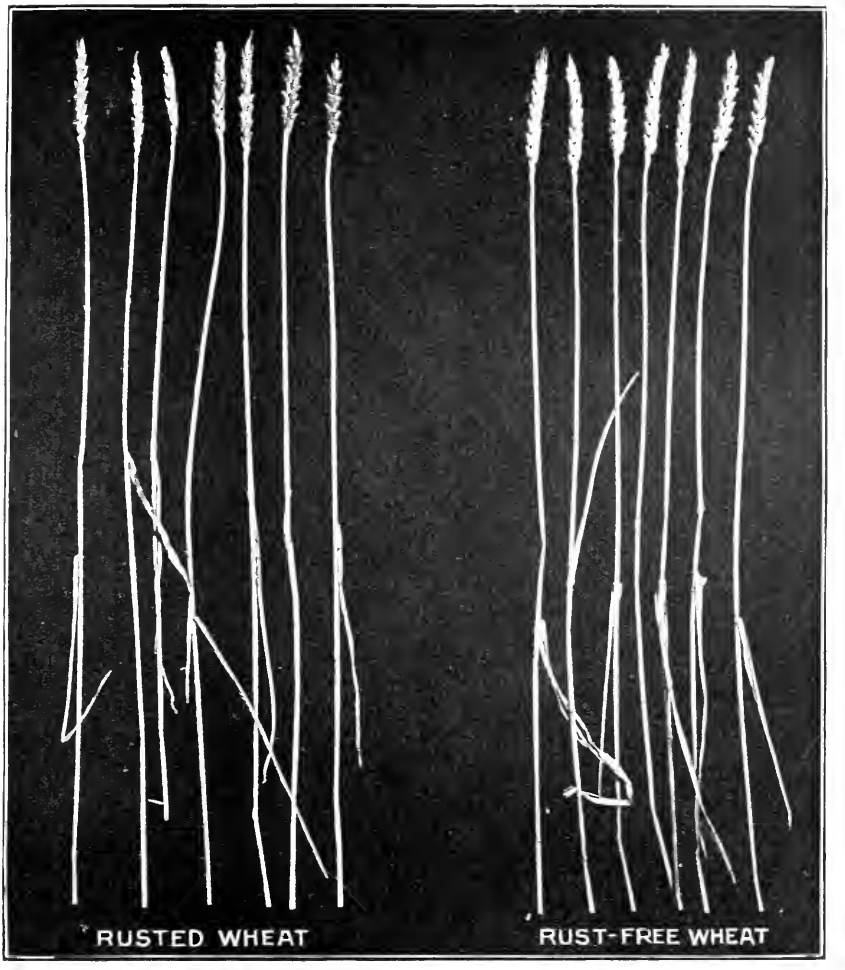
Roots.—A continuance into the inquiry respecting the amounts of dry matter and sugar furnished by the different classes of farm roots has been made. The data will be found of interest and value to all farmers growing roots for feeding purposes.

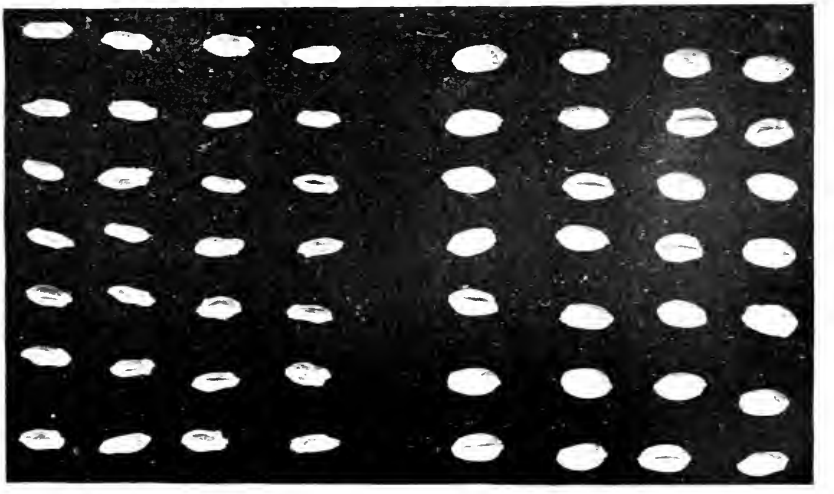
The Effect of Rust on the Straw and Grain of Wheat.—This research was undertaken by reason of the prevalence of rust in the wheat fields of certain districts in Manitoba. It has shown clearly that the rust arrests development of the wheat plant, resulting more particularly in a straw of greater feeding value than that of the normally mature wheat, and in a very much shrivelled kernel, slightly richer in albuminoids than in the plump grain from rust-free wheat.

Well Waters from Farm Homesteads.—Analyses have been made, from the hygienic standpoint, of about 100 samples of well waters from farms, creameries and cheese factories, and reports in detail sent to those forwarding the waters. The tabulated results here given are accompanied by a very brief conclusion as to the quality of the supply. Those desiring to avail themselves of the privilege extended by the experimental farms in this matter should write for a copy of the instructions which it is necessary to closely follow in the collection and shipment of water for analysis.

Intimately connected with the matter of a good water supply is that of an effective drainage system. We have accordingly given an account of the Septic Tank, which, we consider, practically solves the problem of the safe disposal of the sewage of the rural home.

Correspondence.—The letters directed to this division from November 30, 1903, to December 1, 1904, in addition to those referred to us by the other departments of the farm, numbered 1,284; those sent out, 1,251.





KERNELS OF RUSTED WHEAT

KERNELS OF RUST-FREE WHEAT

Samples Received for Analysis.—Subjoined will be found, in classified form, an enumeration of the samples received from farmers for analysis.

SAMPLES received for Examination and Report,

November 30, 1903, to December 1, 1904:

Samples	British Columbia.	North-west Territories.	Manitoba.	Ontario.	Quebec.	New Brunswick.	Nova Scotia.	Prince Edward Island.	Total.	Number still awaiting examination.
Soils	16	23	....	139	5	1	68	1	253	38
Muds, mucks and marls	2	.....	.....	2	3	1	6	2	16	11
Manure and fertilizers	2	.....	.....	7	5	1	5	1	21	5
Forage plants and fodders	2	8	8	65	8	4	16	3	108	2
Well waters	7	20	3	31	15	15	7	2	100	....
Miscellaneous, including dairy products, fungicides and insecticides	12	1	2	69	10	2	5	2	103	26
	41	52	13	313	46	24	101	11	601	82

Acknowledgments.—It is again my pleasure to publicly record my sincere thanks to Mr. A. T. Charron, M.A., Assistant Chemist, and Mr. H. W. Charlton, B.A.Sc., Second Assistant Chemist, who have so well and faithfully performed the tasks allotted to them during the past year. The work of the Chemical Division has very materially increased in all its branches, and necessarily a very large portion of it falls upon these gentlemen. In this work they have manifested an enthusiastic interest, performing their duties with skill and industry. It is for this hearty co-operation that my thanks are particularly due.

I also desire to tender my thanks to Mr. J. F. Watson, who has again performed to my perfect satisfaction the large amount of clerical work in connection with the division.

I have the honour to be, sir,
Your obedient servant,

FRANK T. SHUTT,
Chemist, Dominion Experimental Farms.

SOIL INVESTIGATIONS.

BRITISH COLUMBIA.

Cape Scott, Vancouver Island.—This sample was forwarded by Mr. J. R. Anderson, Deputy Minister of Agriculture, Victoria, B.C., who furnished the following information: 'A virgin soil with a depth of 2 to 4 feet, underlaid by a hardpan. This soil is representative of nearly all the soil on the north-east end of Vancouver Island, except on some small river bottoms. It is lightly timbered with hemlock, cedar, pine, and the soil is covered with moss.'

Surface Soil.—Judging from its appearance, this is very largely vegetable matter and might be rightly classed as peat, or more properly speaking, swamp muck. Though

rich in nitrogen, such soils do not contain this element in a readily assimilable form. The chief disadvantages of soils of this character for farm crops, however, generally lie in the very small proportions of sand and clay they contain and their deficiency in the mineral constituents of plant food—lime, phosphoric acid and potash and, further, their acid or sour character also renders them unfavourable for many crops.

Analysis of (air-dried) Soil.

Moisture	5·26
Organic and volatile matter	81·55
Insoluble residue (clay and sand)	10·65
Oxide of iron and alumina	2·38
Lime	·48
Magnesia	·16
Potash	·06
Phosphoric acid	·09
	100·63
Nitrogen, in organic matter	1·65

The soil as received was strongly acid, and on drying by exposure became extremely hard and refractory.

The above data are in close accord with those we have obtained from swamp or black mucks collected in various parts of the Dominion, and clearly indicate that the remarks already made regarding their characteristics and faults are strictly applicable to the soil under consideration.

The general treatment for their reclamation and improvement may be outlined as follows:—

Drainage.—This should be as thorough as possible. The removal of all free or stagnant water results in the aeration of the soil, the correction of its sourness and the improvement of its mechanical condition by causing it to become more firm or compact.

Admixture with Subsoil.—Whenever the depth of the surface soil will allow the plough to reach the subsoil, there should be a certain admixture of the underlying stratum with the muck. This will serve to improve the latter, both mechanically and chemically. Where this plan is not feasible by reason of the great depth of the surface soil it would be advisable to dress heavily with sand or clay, or better, a mixture of both. Unfortunately, the expense of this latter plan prevents its general adoption.

Fertilizers.—Muck soils, as already remarked, are rich in humus and nitrogen; nevertheless, for a season or two until the soil 'sweetens' and nitrification ensues, dressings of barnyard manure will be found of value in encouraging growth by applying immediately available nitrogen.

The chief requirements of such soils are, however, the mineral constituents of plant food. If wood ashes are obtainable no better fertilizer could be recommended, as they supply lime, potash and phosphoric acid. An application of 50 to 80 bushels per acre, harrowed in, should have a marked effect upon the crop. A dressing of lime, simply, will also be of great value (say, 40 bushels per acre), though it should, if possible, be supplemented by potash and phosphoric acid in one or other of their forms. Marl, a natural deposit of carbonate of lime, frequently found in connection and underlying peat or muck, is very useful for such soils as we are considering. A heavy dressing of 'gas lime' has been found valuable for such soil. Basic (Thomas) slag will, I believe, be found very useful for such soils. It presents phosphoric acid

associated with lime in an alkaline form, and, therefore, particularly adapted for sour, peaty soils. It might be tried at the rate of 300 to 500 lbs. per acre, together with 100 to 200 lbs. of muriate of potash.

In all this work it should be the aim not to bury the fertilizer, but to keep it in the surface few inches of the soil. It will naturally and of its own accord tend to sink.

Crops.—There are few crops that will give lucrative yields on muck soils unless the latter received some treatment as already outlined. Probably Timothy succeeds best of all on the crude muck. Neither roots nor cereals can be considered as naturally adapted to such soils, but several may be grown with profit after the lacking mineral elements have been supplied. Potatoes, mangels, oats and Indian corn have all done fairly well under such improved conditions.

Subsoil.—This is of the nature of a 'hard pan,' consisting chiefly of compacted sand. It, nevertheless, contains some organic matter and nitrogen, as is shown by the following partial analysis.

Analysis of (air-dried) Subsoil.

Moisture	2·99
Organic and volatile matter	11·07
Sand and other rock matter	85·04
	100·00
Nitrogen	·123

This subsoil is not, unfortunately, rich in lime or phosphoric acid, but this should not prevent its judicious admixture with the surface soil wherever possible, for such would undoubtedly enhance the crop-producing power of the latter.

Kingcome Inlet, B.C.—A dark-gray loam of granular texture, in which the comparatively large amount of organic matter is intimately incorporated with the silt and fine sand which form the mineral basis of the soil. Laboratory trials go to show that the mechanical or physical condition of this soil is excellent and that it would be suitable for the majority of farm crops.

Our correspondent, in forwarding the soil, furnishes the following particulars: 'This is representative of the soil in this valley. The soil has been dyked and cultivated for seven years. Occassionally, perhaps once a year, the tide will overflow the dyke. It is underdrained with cedar drains and the water does not lie on the land. The climate here is decidedly wet, for the rainfall is a heavy one, but there is no record kept. Please advise me as to the best fertilizer to use.'

Analysis of (air-dried) Soil.

Moisture	1·70
Organic and volatile matter	10·43
Insoluble matter (sand, &c.)	73·82
Oxide of iron and alumina	13·15
Lime	·25
Magnesia	?
Potash	·64
Phosphoric acid	·26
	100·25

Nitrogen	·369
Available potash	·0188
" phosphoric acid	·0185
" lime	·088

The foregoing results are indicative of great crop producing power The soil contains an abundance of organic matter rich in nitrogen and the mineral elements of plant food—and especially potash—are for the most part present in amounts equal to those in many of our finest and most fertile soils. It may further be stated that the percentages of potash and phosphoric acid in an 'available' condition are considerably above the average.

What perhaps might be termed a weakness of this soil is its small lime content. This fact, in conjunction with the slight, but distinct acid reaction of the soil, leads me to suggest an application of lime, wood-ashes or basic slag as most probably the treatment which above all would give increased crop yields. It is essential, however, that the drainage be made as effective as possible.

Lime might be applied at the rate of 25 to 40 bushels per acre; wood-ashes, 35 to 50 bushels, and basic slag, 300 to 500 pounds per acre. The latter fertilizer, owing to its alkalinity, would, I think, on this soil be a more suitable form in which to furnish lime and phosphoric acid than superphosphate, which is an acid form of phosphoric acid. From the standpoint of economy, it might be advisable to give lime a trial before investing in the more expensive basic slag.

Special examination was made for salt, as it was stated that the tide occasionally overflowed the land, but the amount found, 0·023 per cent, was so small that its presence could not be considered as at all injurious to crops.

Knaft, on Shuswap Lake, near Salmon Arm.—'Virgin' soil from the south side of mountain (Notch Hill) with a lake on the east side of it. It is somewhat elevated, but can be irrigated if necessary.

This is a light-grey sandy loam, and having the appearance of being deficient in humus.

Analysis of (air-dried) Soil.

Moisture	1·32
Organic and volatile matter	3·57
Insoluble residue (chiefly sand)	88·96
Oxide or iron and alumina	5·30
Lime	·27
Magnesia	·22
Potash	·15
Phosphoric acid	·82
	100·61

Nitrogen	·051
Available phosphoric acid	·268
Available potash	·011

The data makes it evident that the want here is organic matter (humus) and its concomitant nitrogen, and we have again to advise the growth and ploughing under of green crops (preferably clover or some other legume) to supplement the available supply of farm manures.

Probably the application of immediately available nitrogen (as in nitrate of soda) will be necessary to induce a vigorous growth until the soil, by the means just advocated, becomes richer in this element.

The soil appears to be remarkably rich in phosphoric acid, and analysis further shows that a considerable proportion is available for plant growth. Judging, therefore, from the present results, an application of a phosphatic fertilizer would not be profitable.

Though the available potash is not very low, the 'total' potash is considerably less than that in average productive soils. It is probable, therefore, that in time potash fertilizers would prove useful.

The lime-content is by no means large and we should, therefore, expect that applications of this element from time to time would be beneficial.

Balfour, 17 miles east of Nelson, West Kootenay, B.C.—'A bench soil, naturally drained, as yet uncropped and unmanured, from 6 to 10 inches deep and overlying a subsoil of white sand, which again rests on gravel. The sample is stated to be representative of at least 1,200 acres.'

The sample forwarded had been taken *in situ* to a depth of 14 inches. The upper 6 inches were considered as representing the surface soil and accordingly the soil to that depth was separated and prepared for analysis. Speaking generally, from an inspection, the soil would be considered as extremely light and sandy and poor in humus, especially below four inches. It had a distinctly acid reaction. The nature of the vegetation on the soil—chiefly mosses—afforded further evidence as to the need of aeration and neutralization.

In a letter to Mr. J. R. Anderson, Deputy Minister of Agriculture, Victoria, B.C., (through whom the soil was submitted) the farmer says: 'The oats and corn that I sowed last spring did not amount to anything, but I am told that all it requires is working. It is said here that the first year or two very little of anything will grow, but that afterwards—when it had become sweet—the soil will give good returns.'

Analysis of (air-dried) Soil.

	Per cent.
Moisture	1·04
Volatile and organic matter	3·15
Insoluble matter (sand, &c.)	84·27
Oxide of iron and alumina	9·94
Lime	·47
Magnesia	·39
Potash	·21
Phosphoric acid	·60
	100·07
Nitrogen	·045
Available potash	·008
Available phosphoric acid	·075
Available lime	·033

The analytical data support the deduction made from the appearance of this soil as to its poverty in organic matter and nitrogen. In both these constituents the percentages are considerably below those in soils of average productiveness, pointing to the desirability of organic manures for the improvement of the soil, both chemically and physically. Green manures, obtained preferably through the growth of one or other of the legumes, are advised in order to supplement the store of farmyard manure. Nitrogen for immediate crop use may be supplied by small and repeated dressings of nitrate of soda or sulphate of ammonia during the early part of the growing season.

Our results would go to show that it is very well supplied with phosphoric acid. Both the 'total' and 'available' are considerably above the average and we should not, therefore, expect a phosphatic fertilizer to be necessary.

The possibilities are strong that the soil will respond to applications of lime and potash. For this, no better fertilizer could be found than wood ashes. If such are not obtainable, potash may be used in the form of kainit or of muriate of potash, and lime —or some compound of lime—as marl or gas lime, as circumstances allow, employed.

PEACE RIVER DISTRICT.

This soil was collected by Mr. James M. Macoun, of the Geological Survey of Canada, during his exploration in the Peace River district in 1903. The analysis was made in order to obtain chemical evidence as to the quality of the land, the results to accompany the report of Mr. Macoun on the agricultural possibilities of that district.

The samples (soil and subsoil) were taken near Saskatoon on Serviceberry lake at the west end of the Grande prairie, Lat. 55° 15′, Long. 119° 11′.

Surface Soil.—A heavy clay loam, but containing a small percentage of fine sand. Black or very dark brownish-black, from presence of humus (vegetable matter). As received, in the air-dried condition, it was in lumps and powder, the former, while not readily friable, could not be considered refractory. It had all the appearance of a fertile loam, and one that would prove suitable for the majority of farm crops, provided it were deep enough.*

It was found to have a very slightly acid reaction. Tested for 'alkali,' only traces of common salt were found, though careful search for injurious sodium and magnesium compounds was made. A qualitative examination for lime, showed that the soil was by no means deficient in this element. A partial analysis of the air-dried sample furnished the following data:—

	Per cent.
Moisture	3·44
Organic and volatile matter	11·82
Nitrogen	·471

We have in these results ample and emphatic evidence of the richness of this soil in humus compounds and nitrogen, equalling in these respects much of the fertile prairie soil of Manitoba and the North-west Territories. Time has not allowed any determination of the potash and phosphoric acid, but judging from past experience with soils of a similar humus and nitrogen content, this soil in all probability is well supplied wth these consttuents.

Subsoil.—This, as received, was in hard, exceedingly refractory lumps, of a greyish colour. Though in appearance and texture it was of an undesirable nature for mixing with the surface soil, analysis showed it to contain notable amounts of organic matter and nitrogen. The data are as follows:—

	Per cent.
Moisture	3·42
Organic and volatile matter	8·01
Nitrogen	·174

The general deductions that I am enabled to make from this preliminary examination are that the soil is by no means wanting in the elements of fertility, the chief drawback being its reported shallowness. With good drainage, careful culture—particularly avoiding all working of the soil when wet—and favourable climatic conditions, it should prove a strong, productive soil, quite capable of yielding remunerative crops.

* Mr. Macoun states that the surface soil is but 3 or 4 inches thick, resting without any gradual transition on the heavy plastic subsoil of clay.

ONTARIO.

New Liskeard, Nipissing District.—A yellowish-red, coarse-grained, sandy loam, showing a fair amount of root fibre and underlaid by clay at a depth of from 6 inches to 2 feet. This soil, our correspondent states, has never been cropped, manured or burnt over and is covered with 'spruce, cedar, red pine, and cyprus.' 'Possibly the area covered by this soil is 20 square miles.'

From an inspection of the soil one would judge it to be deficient in humus and apt, in seasons of drought, to rapidly dry out.

Analysis of (air-dried) Soil.

	Per cent.
Moisture	1·45
Organic and volatile matter	4·57
Insoluble matter (sand, &c.)	84·97
Oxide of iron and alumina	7·74
Lime	·36
Magnesia	·55
Potash	·10
Phosphoric acid	·10
Undetermined	·16
	100·00
Nitrogen	·072

These results indicate that in all the essential elements of plant food—nitrogen, phosphoric acid, potash and lime—this soil is considerably below the average of our productive virgin soils.

Whether it will prove profitable to work such a soil as a farm is certainly doubtful, but that can only be definitely determined by actual trial. The possibilities, however, are that it would yield a larger return in timber, if carefully husbanded and managed according to the principles of forestry. Such soils as the one under consideration may, of course, be improved, and made to give fairly good yields if the requisite amount of plant food be supplied. They are responsive and under favourable climatic conditions with a sufficiency of manure are to a certain degree suitable for potatoes, hay and oats, and perhaps a few other crops. But it must be remembered that soils such as the one under consideration rapidly deteriorate when worked (owing to loss of humus) unless continually replenished with organic matter from one source or another. It seems, therefore, desirable, if employed agriculturally, to use them largely for grazing or to adopt such a rotation as will every few years give the soil a crop of clover or some other legume, and thus keep up the store of humus and nitrogen.

Shallow ploughing should be adopted for a number of years, in order to make practicable the enrichment of the upper few inches of the surface soil. The drainage is possibly good, but if not, it should be made so. The turning under of clover or pease, in addition to the application of such barnyard manure as is available cannot be too strongly recommended, and wood-ashes or a mixed fertilizer containing phosphoric acid and potash, could no doubt be used to advantage to supply the necessary mineral elements.

FERTILIZERS AND AMENDMENTS.

WOOD ASHES FROM SAW-MILLS AT PORT MOODY, B.C.

We have in a former publication (see p. 156, Report, 1901) endeavoured to correct the impression prevalent in parts of British Columbia that there is but little fertilizing

value in the ash of the soft woods—Douglas fir, cedar, &c.—grown in that province, and we have ventured the opinion from the examination of many soils, both on Vancouver Island and on the mainland, that the application of such ashes would be found to give a good return, more particularly on the sandy and peaty loams. It is of interest, therefore, to insert the following analysis of a sample of such ashes recently made in the Farm laboratory.

The correspondent forwarding the ashes says: 'The sample of ash is from the sawmill at Port Moody. There are many tons lying out in the yard and thought to be useless. We in this vicinity, as fruit-growers and gardeners, wish to know what fertilizing value it may have. It is principally the ash from slabs of fir, with some cedar taken from booms out of the salt water. You will confer a great favour on us here by your earliest reply.'

Analysis of Ashes.

Moisture	·82
Potash	1·91
Phosphoric acid	1·76
Carbonate of lime	36·55

Though not equal, as regards potash, to hard wood ashes, I should certainly consider these ashes as a valuable fertilizer, especially in conjunction with farm manures or clover turned under. In addition to the potash and phosphoric acid they contain, there is a notable amount of carbonate of lime present—and this fact alone would make the ashes valuable for the soils already referred to. The probability is, from what our correspondent says regarding the storage of these ashes, that they are partially leached and have thus lost a considerable proportion of their most important element—potash. We are inclined to think that with a little care and protection, such ashes should contain at least between 3 per cent and 4 per cent of potash. The use of wood ashes may be specially recommended for all classes of fruits, for vegetables and other leafy crops, and for the encouragement of vigorous growth in clover.

LEACHED WOOD ASHES.

Occasionally we are in receipt of inquiries regarding the value of leached wood ashes. This value, we have pointed out, will be dependant upon the extent to which leaching has occurred. In the following data we present the results obtained from a sample of such ashes, and they go to show the disastrous effect of exposure as regards the potash content.

Analysis.

Moisture	2·18
Charcoal (loss on ignition)	26·59
Mineral matter (soluble in acid)	54·92
" " (insoluble in acid)	16·31
	100·00
Potash, soluble in water	·24

It is evident that these ashes have been very thoroughly leached, and are of very little value as far as potash is concerned. There will, of course, be a certain amount of phosphoric acid present, probably between 1 per cent and 2 per cent. The greater part of the mineral matter 'soluble in acid' is lime, or, rather, carbonate of lime. For land needing lime, such ashes would be useful, and the price that the farmer or fruit grower should give for them should be estimated entirely from that point of view.

This sample was forwarded from 'an old ashery near St. Catharines, Ont., that has not been disturbed for many years.' We think this is an extreme case of leaching,

but it certainly furnishes a marked illustration of the loss that ashes may suffer through want of proper protection from rain. In former samples of leached ashes examined in the Farm laboratory, we have usually found between 2 per cent and 4 per cent potash.

ASH OF ROCK MAPLE.

A sample of ash from rock maple, forwarded by Mr. James L. Matheson, Dundas, P.E.I., furnished the following data:—

Analysis.

	Per cent.
Moisture	·24
Organic and volatile matter (chiefly charcoal)	12·68
Insoluble residue (clay and sand)	1·32
Potash	12·46
Lime	42·46
Phosphoric acid	2·95

Our correspondent, in forwarding these ashes, says:—'These were obtained from the Rock maple and are much lighter in colour than those usually seen here. We are interested to know how they compare in fertilizing value with ordinary hardwood ashes.'

Good samples of commercial wood ashes will contain, as a rule, from 5 per cent to 6 per cent potash, and from 1·5 per cent to 2 per cent phosphoric acid. It is thus seen that the sample under consideration is much superior, as regards its most valuable element, potash.

We have frequently in our publications called attention to the fertilizing value of wood ashes, especially as a source of potash. Without unnecessarily repeating what has been said as to the composition of ashes and the crops for which they are best suited, it may be advantageous to point out that while the commercial value of ashes will depend upon the potash and phosphoric acid content, the manurial value will be considerably higher. The presence of a large amount of lime, the mild alkalinity of the ash, the particular combinations in which two elements of plant food are held, are all, undoubtedly, factors that enhance the value of wood ashes as a fertilizer. In other words, the benefits derived from their use include, in addition to the supplying of mineral plant food, the correction of sourness, the conversion of injurious iron compounds into harmless forms, the encouragement of nitrification, and the general improvement of the tilth of the soil. It has frequently been noticed that soil to which ashes have been applied is much better able to resist the injurious effect of a protracted drought than adjoining land which has not been so treated.

ASHES FROM MUCK.

Two samples of ashes obtained by the burning of muck in heaps, were forwarded by Mr. James Hopgood, West Cape, P.E.I., who writes: 'These ashes were made by piling soft wood stumps and covering over with partially dried-out muck. The bulk of the ashes is like No. 1, dark-grey and heavy. There is, however, a fair proportion of No. 2, which is light in character and almost white. Do you think it is worth while to go to any expense in making these ashes?'

Analysis.

	No. 1.	No. 2.
Moisture	·77	3·02
Insoluble matter (clay, sand, &c.)	77·83	73·55
Oxide of iron and alumina	7·46	3·89
Lime	6·40	7·00
Potash	·30	·51
Phosphoric acid	·39	·57

In No. 1, there is a very large proportion of sand: in No. 2, the chief constituent is silica—also valueless as plant food.

Though undoubtedly possessing a certain fertilizing value, both these ashes are decidedly inferior to wood ashes. The potash and phosphoric acid are not present in amounts larger than these found in most fertile soils, but they are possibly in a more available condition. The lime would prove beneficial for certain soils, but we do not think the data warrant any great expense in obtaining the ashes. No. 2, is the much more valuable ash, as will be evident from the larger percentages of potash and phosphoric acid.

The most valuable fertilizing constituent of muck is nitrogen, and the next in importance is the organic matter. Both of these are lost in burning the muck, and for this reason we counsel composting by one or other of the methods outlined in our report for 1903.

ASHES FROM CARBIDE WORKS.

These so-called 'ashes' are described as 'the residue from the manufacture of the carbide' and were forwarded from the carbide factory at St. Catharines, Ont. They are not to be confused with the residue from the acetylene gas machine, (resulting from the action of water on carbide), which as we have repeatedly stated, is practically slacked lime. In the formation of carbide in the electrical furnace, the outside portion of the mixture is but imperfectly acted upon and it is this, we conclude, separated from the carbide, that constitutes these 'ashes.'

Analysis.	Per cent.
Moisture	11·51
Loss on ignition (carbon and coke)	13·88
Residue, insoluble in acid	5·86
Oxide of iron and alumina	3·50
Lime (present partly as carbonate)	46·53
Potash	·12
Phosphoric acid	slight traces.
Nitrogen	1·02

As regards the mineral constituents of plant food, it is evident that this material can have no agricultural value, save for the lime it possesses. Phosphoric acid is absent, or practically so, and the potash is present in an amount less than that found in most fertile soils. Such ashes, however, are undoubtedly of value as an amendment for soils deficient in lime or requiring lime to correct sourness or improve their tilth.

The nitrogen is 1 per cent., or 20 lbs. per ton, and the question naturally presents itself as to its availability for plant use. To obtain information regarding this matter certain experiments were made, with the following results:—

1. Ten (10) grams of ashes, to which were added 500 cc. of water, were distilled with magnesia. This resulted in obtaining ·11 per cent nitrogen. This shows that practically 10 per cent of the total nitrogen present exists in the form of ammonia salts, or in such a combination that under the conditions of the experiment ammonium compounds are formed. Distillation with water only gave ·075 per cent nitrogen.

2. Ten (10) grams of the material were digested in the cold with 200 cc. water for two hours and filtered. 100 cc. of the filtrate were distilled after being made strongly alkaline with magnesia, but no ammonia was obtained. This proves that no part of the nitrogen exists either as free ammonia or as ammonium salts.

3. Two (2) grams were extracted in the cold with dilute sulphuric acid, filtered and filtrate made alkaline and distilled. Nitrogen amounting to 0·94 per cent was obtained.

4. Hydrogen was passed over the ashes (5 grams) in a red-hot tube. The gas was conducted into dilute sulphuric acid, which was subsequently made alkaline and distilled. Nitrogen amounting to 0·72 per cent was obtained. Unfortunately the furnace at our disposal for this class of work is not very satisfactory as regards obtaining high temperatures, and it is probably owing to this fact that this experiment did not result in a larger percentage of nitrogen.

However, there seems to be no doubt that the nitrogen of the fresh material exists very largely, if not entirely, as calcium nitride. By paragraph 2, it will be seen that the absence of ammonium salts was proven.

On keeping the ashes, as in a bottle, it was found that a considerable amount of ammonia developed.

As to how soon such nitrogen might become available to plants we cannot at present say, but from the fact that ammonia is so readily formed in the presence of moisture, there seems a strong probability that this material may be found of some value as a nitrogenous fertilizer.

ASHES FROM INCINERATOR.

These are the product of the crematory or incinerator at Montreal. In forwarding them for analysis, the Hon. J. A. Ouimet writes: 'These ashes are from burnt garbage, &c. It is a matter of some importance for farmers and others in the neighbourhood to know what fertilizing value they may possess.'

As received, this sample consisted of fine ash mixed with a large proportion of cinders and clinkers, among which were observed many pieces of glass, crockery and unburnt coal. A few fragments of burnt bone were also noticed.

Analysis.	Per cent.
Moisture	·45
Insoluble mineral matter	75·83
Lime	3·50
Phosphoric acid	1·08
Potash	·44

A mechanical separation gave 66 per cent cinders, &c., and 34 per cent fine ash.

The fertilizing value of these ashes, it will be seen, is extremely small, being represented practically by the phosphoric acid, which the analysis shows to be in the neighbourhood of 1 per cent. We cannot, therefore, regard this waste product as of any importance from the manurial standpoint. It might, however, be used to advantage on heavy, plastic clays. Upon such, ashes of this character have an ameliorating effect by lightening and mellowing and otherwise beneficially affecting the mechanical condition of the soil.

CALCAREOUS DEPOSITS FROM BRITISH COLUMBIA.

Deposits of tufa-like appearance, with a semi-crystalline, more or less honey-comb structure, occur not infrequently in various parts of the country in or adjacent to the so-called dry belt of British Columbia. As a rule this material is reported as found in the valleys or canyons, apparently issuing from the hillside as a plastic mass, covering possibly a considerable area, and subsequently hardening by simple exposure. From an examination of one of the deposits made by the writer in the Nicola valley last summer, it is evidently formed by the evaporation of waters or springs highly charged with carbonate of lime, held in solution by carbonic acid. One correspondent writing respecting this deposit, says: 'As the growth of the vegetation in the immediate vicinity of the deposit is very vigorous, the material must be of some importance as a fertilizer.'

At the request of Mr. J. R. Anderson, Deputy Minister of Agriculture, Victoria, B.C., we have analysed specimens collected at Enderby, Okanagan Mission, Nicola Lake and East Kootenay. There was a strong similarity between these samples; with the exception of the one from Okanagan, it would have been difficult to distinguish them the one from the other.

Analysis of Calcareous Deposits.

Locality.	Carbonate of Lime.	Insoluble Matter (Clay).	Oxide of Iron and Alumina.	Organic Matter, Magnesia, &c.
	p. c.	p. c.	p. c.	p. c.
Enderby	94·14	·61	·60	4·65
Nicola Lake	95·71	·63	·86	3·00
East Kootenay	95·33	·35	·65	3·67
Okanagan Mission	79·75	3·40	18·93	6·92

They are all essentially carbonate of lime, the first three mentioned in the table being very similar in composition, and of excellent quality.

As this material is usually extremely hard, it would seem that in order to make it effective agriculturally, it would be necessary to crush or grind it to a powder. But most probably the best plan would be to burn it. The resulting lime would, I think, be found very serviceable, especially on the strong clay soils, as about Enderby and Armstrong. It would be valuable to low-lying and mucky soils, which as a rule are excessively rich in organic matter and nitrogen, but deficient in mineral matter constituents.

It is of interest to note that the analysis of a second sample of the Enderby deposit, forwarded after being burnt and allowed to air-slake, gave 90·23 per cent slaked lime and 1·33 per cent oxide of iron and alumina. Its quality was such that it could be well used for making concrete, and for other building purposes.

BONE FROM WHALE.

This sample consisted of two pieces of rib bone, dry and bleached by exposure. It was forwarded from East Leicester, N.S., and accompanied by the information that there were about 20 tons of the bones procurable in the locality at a cost of $10 per ton. Our correspondent, with others, was anxious to learn how they compared with the ordinary bone meal on the market.

Analysis.

Moisture	7·41
Organic and volatile matter* (gelatine, fat, &c.)	35·95
Mineral matter (phosphate of lime, &c.)	56·64
	100·00
Phosphoric acid (equivalent to 47·33 per cent phosphate of lime)	21·68
Nitrogen	2·98

Reference to the last issue of the bulletin on Commercial Fertilizers (Inland Revenue Department) shows that the bone meals upon the Canadian market contain between 2·7 per cent and 4·7 per cent nitrogen, and from 19·0 per cent to 26·0 per cent

* Containing 11·95 per cent fat.

phosphoric acid. We may safely conclude, therefore, that as regards these essential elements, this bone does not differ in any marked degree from the bone meal generally sold, the price of which is in the neighbourhood of $25 per ton.

It has not, however, the same agricultural value of bone meal, for two reasons: its unground condition and the presence of a considerable quantity of fat. The degree of fineness and the proportion of fat in a very large measure control the rapidity with which the bone is decomposed in the soil and its plant food liberated in available form; the finer the bone and the freer from fat, the more valuable it is from the standpoint of a fertilizer.

In the event of its being impracticable to have the bones ground or treated for conversion into superphosphate, it is suggested that the bones be broken and crushed, composted with barnyard manure, wood ashes or with alkali, according to one or other of the methods outlined for the reduction of bones on the farm and described in our report for 1895. Unbroken and untreated, the bones would be of very little immediate value as a fertilizer—they would probably remain for years in the soil with but little decomposition.

THE CONTROL OF SOIL MOISTURE.

Among the several factors that go towards successful orcharding three may be mentioned which are intimately connected: (1) the control of the soil's moisture at different seasons of the year, (2) the maintenance or increase of the fertility of the soil and its mechanical improvement, and, (3) the furnishing of 'cover' to protect the roots of the trees during the winter. By cultivation, followed by the growth of a cover crop, all these objects may be attained, but as soils and climatic conditions throughout the country are not the same, it will be evident that the plan—as regards periods to be under cultivation and under crop—best adapted to one locality may require modification before giving equally good results in another.

In order to test various modifications of this system as regards soil treatment, and to obtain information as to the fertilizing value of certain new crops or new combination of crops, experiments were begun a number of years ago on the Experimental Farm, Ottawa. The results of these investigations have appeared in the annual reports of the farms. In continuing this work during the past season, we have carried on experiments at Ottawa and at Nappan, N.S., the information sought being solely with regard to the control of the soil's moisture.

Experiments at the Experimental Farm, Ottawa, Ont.

Two series of experiments were instituted; the first, to ascertain the comparative effect of cultivation and mulching on the soil's moisture; the second, to learn the relative amounts of water withdrawn by certain crops sown broadcast and in drills, respectively—in the case of the drill-sown crop the cultivation was carried on between the rows as long as practicable.

Series I.—Consisted of 5 plots, A, B and C, adjoining one another; D and E also adjoining one another, but in a different part of the orchard from the first three named. The soil of one plot (A) was to be kept in 'clean culture' throughout the season and its moisture content, compared with that of a soil carrying a growing crop of Hairy Vetch, uncut (plot B), of a soil with Hairy Vetch cut and mulched (plots C and D), and of a soil with a crop of mixed clover and Timothy (E) cut and used as mulch.

Plot A was ploughed May 6, cultivated June 10, 25, July 25.

Plot B had been sown in 1903, with Hairy Vetch, which before the close of the season had practically covered the ground. The vetch survived the winter well and during the early part of the present (1904) season produced an excellent, though somewhat patchy, growth. Towards the end of July the crop began to die and it was cut August 5, to be saved for seed.

Plots C and D differed from B only in the cutting and mulching of the Hairy Vetch. The crop was cut June 2 and left on the ground. From an observation made shortly after the cutting, it was thought that the vetch would not produce any aftermath, and that it would not long survive the cutting. This proved to be the case. The vetch rapidly died and its place was taken by a growth of Foxtail, &c. These facts are indicative of the unsuitability of Hairy Vetch if it is desired to mulch. Further, the data of these two plots as regards the effect of mulching on the moisture content must not in any sense be considered conclusive.

Plot E was in clover and Timothy, sown 1903. Throughout the season it gave but a 'thin stand,' the clover gradually disappearing. The dates of cutting are May 28, June 29, July 24, and August 17. The cut herbage was all allowed to remain as a mulch, but being very light acted poorly in that capacity.

The samples were collected every two weeks from May 9 to August 28, and were taken to a depth of 14 inches.

It will be noticed that at the outset the percentage of moisture in Plot A is considerably lower than that of the other plots of the series. Four days previous to the collection of the sample this plot had been ploughed but not disked or harrowed. This neglect resulted in a most serious drying out of the soil. When soil, and especially that which has been in sod, is left in ridges, the air freely circulates about and through it, with the effect just noted. If moisture is to be conserved it is essential that the ploughing be followed immediately by the disc and smoothing harrows. It is only thus that a fine earth mulch will be formed and evaporation checked. Although there was a very fair rainfall—one above the average, indeed—for May, this plot did not equal the others by several percentages until June 6, so seriously had its soil been dried out. There is in the results of this plot during May an important lesson alike for the farmer and the orchardist.

From the fact already referred to, that the growth of Plot B was not as uniform as could be wished, it may not be wise to discuss the details too closely. We had hoped inferences might be drawn from its data as to the relative amount of moisture withdrawn from the soil by Hairy Vetch or conserved by the shade of its foliage. As the summer may be described as both cool and wet, and as the soil was in places not entirely covered with foliage, we only feel justified in saying that the data do not indicate any great exhaustion by the Hairy Vetch of the soil moisture. Probably the loss which would otherwise ensue from the setting up of capillarity is prevented by the shade furnished by the crop, the heavy foliage, undoubtedly, would act beneficially and effectively as a mulch.

On Plot C, the crop (Hairy Vetch) was cut on June 2, and the crop left on the ground. There was not, however, a sufficiency to cover the plot and we find that as the summer advanced, moisture to some extent was lost through capillarity being established. Consequently, in July the soil of this plot was drier than that of either A or B.

The growth on Plot D was very scanty, resulting in an exceedingly thin mulch when cut, and we have, therefore, in the data, evidence of the drying out through capillarity and evaporation, especially in the latter part of June and during July.

The results of Plot E are similar in trend to those just considered, though showing a still further exhaustion of soil moisture. This was undoubtedly due to the stronger growth on Plot E, which of course, means more soil moisture lost through transpiration. Our results in 1902 and 1903 showed most emphatically the great draft made by a sod on the soil's moisture and the reduction to 4·7 per cent (July 18) was most assuredly chiefly due to the same cause, the large amount of transpiring surface.

SERIES 1.—CONSERVATION of Soil Moisture—C. E. F., Ottawa, Ont., 1904

Date of Collection.	Rainfall.	Plot A. (Cultivated.)			Plot B. (Hairy Vetch—Uncut.)			Plot C. (Hairy Vetch—Mulched.)			Plot D, (Hairy Vetch—Mulched.)			Plot E. (Clover and Timothy Mixture—Mulched.)		
		Water.			Water.			Water.			Water.			Water.		
		Per cent.	Per acre.		Per cent.	Per acre.		Per cent.	Per acre.		Per cent.	Per acre.		Per cent.	Per acre.	
			Tons.	Lbs.		Tons.	Lbs.		Tons.	Lbs.		Tons.	Lbs.		Tons.	Lbs.
May 9	*3·97	8·56	189	1,002	12·45	310	1,973	10·71	243	1,139	12·81	297	823	11·54	263	608
" 23	1·97	11·98	275	1,037	12·37	285	1,508	14·55	341	1,494	13·02	303	34	13·92	327	700
June 6	2·95	13·58	318	196	13·23	308	1,299	13·78	323	1,063	12·21	282	550	13·71	321	1,253
" 20	·59	10·83	245	1,717	10·24	230	1,873	12·48	288	1,315	8·88	197	553	6·60	143	99
July 4	1·41	14·18	331	946	16·07	387	1,183	12·80	296	1,111	7·06	153	1,544	7·44	162	1,428
" 18	·86	15·29	361	1,586	11·17	334	400	11·36	259	876	8·91	198	1,489	4·70	99	1,669
Aug. 1	1·81	17·18	119	1,846	14·88	353	1,745	13·54	317	29	12·38	286	34	11·08	252	482
" 15	·40	13·53	316	1,487	10·52	237	1,987	8·49	187	1,616	6·26	135	174	7·90	173	1,274
" 29	2·40	14·39	340	522	12·53	289	1,969	12·72	295	567	10·35	233	1,407	10·59	239	1,530

* From April 1 to May 9.

SERIES H.—CONSERVATION of Soil Moisture—C. E. F., Ottawa, Ont., 1904.

Date of Collection.	Rainfall.	Plot M. (Buckwheat, broadcast.)		Plot N. (Peas, in Drills.)		Plot O. (Hairy Vetch, broadcast.)		Plot P. (Hairy Vetch, in Drills.)		Plot Q. (Soja Beans, in Drills.)		Plot R. (Horse Beans, in Drills.)	
		Water.		Water.		Water.		Water.		Water.		Water.	
		Per cent	Per acre.	Per cent	Per acre.	Per cent	Per acre.	Per cent	Per acre.	Per cent	Per acre.	Per cent	Per acre.
			Tons. Lbs.		Tons. Lbs.		Tons. Lbs.		Tons. Lbs.		Tons. Lbs.		Tons. Lbs.
July 4	*1·41	11·20	258 1,630	8·86	199 969	8·42	188 1,334	11·77	273 1,488	11·91	277 881	11·45	265 678
" 18	·86	10·75	247 331	8·30	185 1,469	7·78	173 243	11·24	259 1,645	11·11	256 951	11·14	257 501
Aug. 1	1·81	10·81	248 1,421	10·45	239 922	10·19	232 1,654	13·31	315 2	13·51	320 1,068	12·77	300 813
" 15	·40	4·31	92 852	5·08	109 1,614	4·95	106 1,731	9·48	214 1,812	11·56	268 413	8·70	190 124
" 29	2·10	11·60	269 543	8·90	200 918	7·58	168 601	12·80	301 443	10·20	233 165	10·06	230 988
Sept. 12	1·10	11·80	274 1,670	9·42	213 808	9·02	203 888	13·82	329 137	12·12	283 14	10·43	238 1,899
" 26	2·71	12·97	305 1,625	12·30	287 1,599	12·08	281 1,889	14·29	342 251	11·66	358 729	15·31	365 113
Oct 10	3·00	11·37	263 495	10·39	237 1,854	10·38	237 1,365	13·51	320 1,068	14·11	337 216	11·92	277 1,410

From June 20 to July 4.

Series II.—The purpose in establishing this series of plots (M, N, O, P, Q, R,) was to ascertain the relative degree to which certain crops reduced the soil's moisture by their growth and, further, to gain information regarding the soil's moisture content when the same crop is sown broadcast and in drills. With respect to this latter feature it may be pointed out that the broadcasted crop may be supposed to conserve moisture by shading the soil; while with the crops growing in drills, cultivation may be practiced with the same object. We wished to learn which of these was the most effective.

The investigation was carried on between July 4 and October 10, the collection of samples being made fortnightly to a depth of 14 inches.

The crops (see table) were sown on June 27, and the cultivations of those sown in drills were made on July 16 and 27, and August 12.

Unfortunately, owing to the initial moisture contents of Plots N and O being considerably less than that of the others, we are unable to compare the percentages throughout the series. By comparing the losses or gains of one plot with those of another, however, some idea may be gained as to the relative effect on the soil's moisture by the different methods under trial, and it is this plan we shall follow in considering the data of this series.

Reference has already been made to the nature of the season. It will be noticed from the tabulated data that with the exception of the fortnight ending August 15, no period (of two weeks) passed without an ample precipitation. This fact renders the results, from the standpoint we are considering them, of much less value than if the summer had been dry and warm. The results of this heavy rainfall, for instance, increased the moisture of all the plots between July 18 and August 1, though at that time they were carrying vigorously growing crops.

Between August 1 and 15, slightly less than half an inch of rain fell, and it might, therefore, prove instructive to make a comparison of the plots on that date. The losses between July 4 and August 15 were as follows:—

Plot M.—With a good crop of buckwheat the loss was 6·89 per cent, or 166 tons per acre.

Plot N.—This was in pease, but the growth was not very good, much of the land being occupied by weeds. The loss was 3·78 per cent, or 90 tons per acre.

Plot O.—Hairy Vetch, broadcast, good growth. The loss was 3·47 per cent., or 82 tons per acre.

Plot P.—Hairy Vetch, in drills, and cultivated between rows. The loss was 2·29 per cent, or 59 tons per acre.

Plot Q.—Soja Beans, in drills, and cultivated, not a heavy growth. The loss was only 0·39 per cent, or 9 tons per acre.

Plot R.—Horse Beans, in drills, and cultivated. The loss was 2·75 per cent, or 75 tons per acre.

Without reading too much into these results we may safely conclude that the buckwheat extracted the most moisture, and this conclusion, as regards the effect of a grain crop in drying out the soil, received confirmation by the data obtained from the growth of a crop of oats as instanced in the Nappan experiments, hereafter to be discussed.

Comparing the effect of Hairy Vetch broadcast and in drills, there is a notable difference in favour of the latter method when it is desired to minimize the loss of moisture.

With Soja Beans, in drills, the loss had been insignificant, though during the succeeding fortnight, August 15-29, the moisture fell off a little, probably owing to increase in foliage. On this plot, however, the moisture content was remarkably constant throughout the whole period of the experiment.

With the exception of the remarkable and unaccountable loss of moisture in the plot with Horse Beans, the results of August 15 clearly indicate that much moisture may be saved by sowing the crops in drills and cultivating between the rows from time to time throughout the summer months.

CONSERVATION of Soil Moisture, Nappan, N. S., 1904.

Date of Collection.	Rainfall.	Plot 1.		Plot 2.		Plot 3.		Plot 4.		Plot 5.	
		Water.		Water.		Water.		Water.		Water.	
		Per cent.	Per acre.	Per cent.	Per acre.	Per cent.	Per acre.	Per cent.	Per acre.	Per cent.	Per acre.
	Inches.		Tons. Lbs.		Tons. Lbs.		Tons. Lbs.		Tons. Lbs.		Tons. Lbs.
May 12	*3·09	18·41	406 1,417	20·00	450 1,231	18·09	398 155	20·83	475 1,350	18·93	420 1,757
" 26	1·50	17·21	374 1,379	18·02	396 398	18·43	407 500	21·21	484 1,165	18·97	421 1,952
June 9	·97	12·52	257 1,931	17·84	391 642	19·24	429 826	20·31	459 1,904	14·04	294 799
" 23	1·60	10·46	210 1,125	17·40	379 1,391	17·71	387 1,832	20·46	463 1,292	11·65	237 1,352
July 7	·63	9·06	179 1,144	16·70	361 715	17·46	381 563	19·14	426 1,304	11 22	227 1,590
" 21	·46	7·46	145 606	13·43	279 1,247	16 35	352 609	20·51	465 1,855	12·06	247 376
Aug. 4	1·05	8·23	161 1,292	9·49	188 1,977	15·10	320 1,159	18·11	398 1,230	10·36	208 633
" 18	1·15	9·80	195 1,666	10·30	212 1,091	15·71	335 1,887	20·26	457 1,924	13·66	285 341
Sept. 6	3·55	17·79	380 95	16·99	368 1,835	20·13	454 566	24·04	570 895	20·22	456 1,657
" 20	1·26	14 91	315 1,677	16·31	351 549	17·99	395 789	18·09	398 155	19·87	446 1,921
Oct. 31	6·94	21·33	488 1,413	19 77	444 313	21·42	491 662	26·02	633 1,913	19·71	442 669

* Total amount of rainfall from April 9 to May 12.

Experiments at Experimental Farm, Nappan, N.S.

As already stated, the treatment of an orchard soil, with respect to the control of its moisture-content, will naturally be largely regulated by the climatic conditions likely to prevail in the district. Thus, we find that the practice in the Niagara district and west, in regard to the time of ploughing under the cover crop, &c., differs, and rightly so, from that in vogue in eastern Ontario and Quebec. Recognizing this, the value of data from experiments similar to those carried on in the orchards at Ottawa for some years past, but obtained in the various fruit-growing areas of the Dominion, will be obvious. With this in mind, a series of experiments was conducted during the past season on the Experimental Farm, Nappan, N.S. The work in connection therewith at Nappan was conducted by Mr. W. S. Blair, the Horticulturist, who in his report is giving full details regarding the plots, their treatment and the results obtained; the moisture determinations were made in the farm laboratory, Ottawa. These latter are given in the subjoined table, being expressed as percentages and as tons per acre to a depth of 14 inches of soil. We purpose merely to utilize these data here in so far as they may furnish information relating to the effect of crops in general and clean cultivation on the soil's moisture-content.

Plots adjoining one another on soil of uniform character, clay on clay subsoil.

Plot 1.—Seeded to Winter Rye and Clover in autumn of 1903. Rye harvested August 3, 1904, crop standing 55 inches. Clover made but poor growth and was not entirely covering the ground when the season closed.

Plot 2.—Seeded to Crimson Clover in 1903, which was winter killed. Ploughed May 26, 1904, worked and seeded with oats June 20.

Plot 3.—Seeded to Crimson Clover, 1903, which was winter killed. Ploughed May 13, worked and cultivated May 29, June 20 and 29. Seeded to Alfalfa July 7, which made a strong growth, 12 inches high, before the close of the season.

Plot 4.—Seeded to Crimson Clover in 1903, which was winter killed. Ploughed May 13, 1904, disked and harrowed May 29, June 20 and 29, July 7, 13, 25. Crimson Clover sown July 25. This made excellent growth.

Plot 5.—Seeded to Oats, Mammoth Red and Alsike Clovers and Timothy, in spring of 1903. It made excellent growth and was cut for green feed. In 1904 the growth of clover was good; it was cut and fed June 23. A matt of growth 5 to 8 inches remained at the close of the season.

THE EFFECT OF GROWING RYE ON THE MOISTURE-CONTENT OF THE SOIL

The most striking results are those from plot 1, which, as we have seen, carried a crop of rye until August 3. At the outset (May 12) the moisture-content of this soil did not differ widely from that of the others of the series. Very shortly after this date, however, this soil (No. 1) began to lose moisture, so that by June 9, in spite of the fact that 2½ inches of rain had fallen during the first month of the experiment the water-content was reduced 5·89 per cent (from 18·41 to 12·52 per cent)—equivalent to a loss of, practically, 150 tons from the first fourteen inches of soil per acre. This was, of course, due chiefly to the large amount of water used by the growing rye on this plot, but a part of this water was no doubt lost through capillarity being established (the soil not being stirred) and subsequent evaporation.

On June 23 the percentage of moisture in this soil was further reduced to 10·16, while the soils of plots 2, 3 and 4 (at this time in clean cultivation) practically maintained their initial percentages. By July 9, though an inch of rain had fallen during the preceding fortnight, the soil of this plot (No. 1) had lost another 1·5 per cent of water. The moisture-content on July 21 showed a still further reduction; it was now but 7·46 per cent, practically one-half of that in soils of plots 2 and 3, and but one-third of that of plot 4. The comparison between the moisture-content of soils in crop

and under cultivation during this season of the year (May 12 to July 21), *i.e.* between the results from plots 1 and 2, makes it evident that there was lost from the soil bearing the crop, practically 90 tons per acre *more* water (equivalent to 9 inches of rain) than from the soil under cultivation. It is during this period that the fruit tree makes its growth. For this, as well as for the development of its fruit, it is essential that there should be a sufficiency of soil moisture at this time in the orchard soil, and our present results indicate most clearly how the trees may be robbed of this moisture by a growing crop of grain. The condemnation of this practice of taking a grain crop from the orchard is most certainly emphasized by the results of this investigation.

THE EFFECT ON THE MOISTURE-CONTENT BY VARYING PERIODS OF CULTIVATION.

By reference to the brief description of the plots 2, 3 and 4, it will be observed that their respective treatment differs in the length of time during which cultivation was continued. With plot No. 2 this period was from May 26 to June 20; with No. 3, from May 13 to July 7, and with No. 4, from May 13 to July 25.

During the month of June, as might be expected, the moisture-content of all three plots is fairly constant: the cultivation evidently was effective in preventing the drying out of the soil, which we have seen was so marked at this period in plot No. 1.

After June 20 cultivation ceased, however, on plot 2, and immediately the soil began to lose moisture. This loss became greater and greater as the season advanced, owing to the increased demands of the crop (sown June 20). On August 18 this soil showed 5 per cent less moisture than plot 3 and 10 per cent less than plot 4. Towards the end of August heavy rains set in which served to equalize the moisture-content of all the plots.

From the fact that plot No. 3 was cultivated till July 7, we find the percentage of moisture in this soil fell but little to that date, the decline from the beginning of the experiment being from merely 18·09 per cent to 17·45 per cent. As the Alfalfa on this plot (sown July 7) grew, soil moisture was utilized and the percentage correspondingly reduced.

The results of plot No. 4 are in accord with those of Nos. 2 and 3: that is, they furnish additional evidence regarding the effect of cultivation in conserving moisture. The water present in this soil, cultivated to July 25, was practically unchanged till the first week of August, when it fell about 2 per cent.

We may safely conclude from a consideration of these three plots (2, 3 and 4), that the later the cultivation is continued the less falling off in soil moisture will there be as the season advances. These results may also serve to remind us that cultivation should not be continued into the autumn, or late growth will be stimulated and the due ripening of the wood prevented before winter sets in.

In plot No. 5, we have an example of a soil bearing a crop (principally clover) throughout the season. The reduction in moisture-content during the month of June was almost equal to that of plot 1, carrying a crop of Winter rye. The cutting of this plot (No. 5) on June 23, undoubtedly checked this loss of moisture, but it did not altogether prevent it, as evident by the data of August 4, which showed that the moisture at that date had been reduced to 10·36 per cent—practically 8 per cent less than that of plot 4.

INOCULATION FOR THE GROWTH OF LEGUMES.

We have received during the past two months numerous inquiries from all parts of Canada on this subject. This re-awakened interest in the matter of inoculation is undoubtedly due to the wide publicity given to the new cultures now being prepared and distributed by the Bureau of Plant Industry, Washington, D.C., U.S. A beautifully illustrated article in *Scribners* monthly for October, setting forth in popular language the claims made for these cultures and the results that have been obtained, is particularly answerable for the present demand for inoculating material. It has

become necessary, therefore, to make a brief statement as to what has been done in this important research by the Experimental Farms and our present position as regards the necessity or desirability of generally distributing the cultures.

1. For many years we carried on experiments, both in pots and in the field, with cultures of nitrogen-assimilating bacteria, prepared in Germany, publishing the results in the Experimental Farms reports (1897-8-9). In certain instances it was found that the cultures favoured the growth of legumes, clover, beans, &c., but there was not sufficient evidence to justify us in recommending them for general use. The cultures were found particularly susceptible to light and heat, and under the best conditions of preservation their vitality could only be guaranteed for six weeks from the date of their preparation. It was felt that the matter was still in the experimental stage, and for the reasons just stated it was not desirable to make any general distribution of the cultures.

Since these experiments were made, the preparation of the cultures, known as Nitragin, has been discontinued, owing, we presume, to lack of sufficient demand for the preparations.

Last spring we were kindly supplied by the authorities at Washington with samples of their new cultures for Red clover and Alfalfa. It is claimed for these cultures that by reason of the method employed in their preparation and the mode in which they are sent out, they are more potent and more stable than the cultures formerly made in Germany. We experimented with these preparations, using pots filled with sterilized soil. The directions issued with the cultures were carefully followed. While it is true that nodules were found on many of the plants growing in the inoculated pots, these nodules were few and of small size and no general increase in the weight of the crop was to be observed as a result of the use of the cultures. Further, as nodules developed on plants in two of the control (uninoculated) pots, we were unable to decide if the cultures had been effective or not. It is certainly to be regretted that the results this year have not been more satisfactory, but at present, from our own experience we cannot report very favourably. Further trials will be made next season, both in pots and in the field, and the results made known in due course.

The attention of farmers may be drawn to the fact that effective inoculation for clover and Alfalfa may be obtained by the use of a certain amount of the soil from fields growing good crops of these plants. This method has proved most successful. Such soil is not difficult to obtain in all the provinces save, perhaps, Manitoba and the North-west Territories. Directions for using such soils have from time to time been issued by us.

For many years past, as is well known, particular attention has been paid by us to the system of soil enrichment by the growth of legumes and to the various means that could be taken to obtain a vigorous growth of the crop. In this connection I should like to add that our experience and observation have shown that the necessity of inoculation is not so great as was at one time thought. We are led to believe that the existence of the bacteria that serve to fix the nitrogen in the legume is by no means restricted to small or isolated areas. We have found—at all events in Ontario and the eastern provinces—that failures in the past to obtain a good catch of clover have been due rather to deficiency of moisture, or unsuitable mechanical condition of the soil, or insufficient drainage, than to the absence of nitrogen-assimilating germs. The general—though probably not universal presence of root nodules on the clover in Ontario and the east lead us to believe that special means for inoculation have not been necessary save, perhaps, in exceptional instances in the aforementioned provinces. It was due to these facts, we consider, that there has been no general demand for inoculating material.

In my recent tour through British Columbia, I found these organisms present upon every root of clover examined, and I took especial care to obtain information upon this matter in all the agricultural districts I visited. The same stands true alike for the irrigated soils of the dry belt (Nicola and Okanagan valleys), as well as for

the lower Fraser and the coast soils and those of Vancouver Island. The luxurious crops of clover observable in British Columbia almost everywhere this year convinced me that inoculation was not generally necessary in this province.

My impression is that the severity of the winter, lack of sufficient moisture, and an uncongenial condition of the soil, or poor seed, will be found to militate more against successful clover growing than any supposed lack of the nodule bacteria, though I would not say that artificial inoculation would not be advantageous in certain districts.

It would seem from certain inquiries received lately from farmers that there is an impression abroad that the benefit to be derived from the nitrogen-fixing bacteria can be obtained directly from inoculation of the soil, *i.e.*, without the agency of the clover crop. This is, of course, erroneous. It is only through the growth of the clover (or other legume) and the subsequent decay in the soil of its roots (or whole plant) that the soil is enriched in humus and nitrogen. It is obvious, therefore, that where clover grows luxuriantly inoculation is unnecessary. We feel safe in saying that the roots of such clover will be found plentifully supplied with nodules.

FODDERS AND FEEDING STUFFS.

FODDER CORN, AS GROWN IN HILLS AND DRILLS.

The feeding value of the corn crop at various stages of growth was determined in the Farm Laboratories in 1896 and the results published in the report of the Chemical Division for that year. Amongst other interesting facts brought out by that research, it was shown that there was a very large increase of nutrients to be obtained simply by allowing the corn to come to the 'glazing' condition before cutting for the silo or for curing in the field as a fodder. This condition or stage of growth is not reached when the corn is sown broadcast, and hence the method of planting in hills or drills was strongly recommended. The question has since arisen: Which produces the greater weight per acre of real cattle food, corn planted in hills or drills?

To obtain information on this point the investigation now discussed was begun in 1901 and continued during the seasons 1902 and 1903. We have consequently three years' data from which deductions may be made. Two varieties of Dent corn, Selected Leaming and Mammoth Cuban, and a similar number of Flint varieties—the Longfellow and Canada White—were chosen and planted in hills and drills respectively, this part of the investigation being conducted on the experimental plots of the Experimental Farm at Ottawa.* When the respective corn had reached the 'glazing' stage, or as near as the season would permit to that condition, it was cut, the weight per acre ascertained and samples taken for analysis.

The analytical data in detail are given at the close of this article, and are of considerable value in showing the variations in composition that may occur from various causes from year to year in the same variety, and in throwing light upon several other matters of equal interest connected with the growth of the plant. For the purpose of our present inquiry, however, the problem will be much simplified if we consider merely the averages obtained from these results.

*The drills were 35 inches apart, with 6 to 8 inches between the plants. The hills were also 35 inches apart, with an average of four to five kernels in a hill.

Composition of Corn Fodder (fresh material)—Four Varieties. Average of 3 Years.

	Hills.	Drills.
Water	80·81	79·05
Dry matter	19·19	20·95
	100·00	100·00
*Crude protein	1·55	1·50
Fat	·08	·07
Carbo-hydrates (nitrogen-free extract)	11·04	12·31
Fibre	5·38	5·91
Ash	1·14	1·15
*Nitrogenous substances—		
Albuminoids	6·96	6·29
Non-albuminoids	1·28	6·29

Fresh Material.—Compared weight for weight, the fodder produced in drills contains slightly more dry matter, the increase being in the carbo-hydrates (starch, &c.) and the fibre.

In the more important nutrient, crude protein, the fodder from the hills is very slightly the richer, and this relation holds good on further analysis of the nitrogenous bodies, the percentage of albuminoids or true flesh formers being somewhat lower in the corn grown in drills. These differences, with the exception of that relating to the dry matter, are, however, exceedingly small and cannot in themselves be considered of any great significance from the feeding value standpoint.

Composition of Corn Fodder (dry matter)—Four Varieties. Average of 3 Years.

	Hills.	Drills.
*Crude protein	8·24	7·22
Fat	·42	·35
Carbo-hydrates (nitrogen-free extract)	57·64	59·43
Fibre	27·76	27·40
Ash	5·94	5·60
*Nitrogenous substances—		
Albuminoids	6·96	6·29
Non-albuminoids	1·28	·93

Dry Matter.—The only difference worthy of special notice here is the percentage of protein, which is somewhat higher in the case of the hill-grown corn. This, as might be expected, is accompanied by a correspondingly lower percentage of carbo-hydrates. In albuminoids (the more valuable part of the crude protein), the dry matter of the fodder from the hills is about three-quarters of a per cent (·75 per cent) the richer.

In summing up the data of the investigation so far discussed, it seems justifiable to conclude that the fodder from the corn planted in drills is slightly the more valuable by reason of its larger proportion of dry matter, but that in albuminoids (the true flesh formers) the hill-grown fodder is a little the richer.

We may now consider the data of the yields per acre and thus arrive at an answer to the question which was the occasion and incentive of this investigation.

Yield and Weight of Nutrients per Acre—Four Varieties, Average of 3 Years.

	Hills.		Drills.	
	Tons.	Lbs.	Tons.	Lbs.
Weight of crop	18	146	19	162
Dry matter	3	1,123	4	60
*Crude protein	..	564	..	583
Fat	..	28	..	30
Carbo-hydrates (nitrogen-free extract)	2	74	2	732
Fibre	1	30	1	254
*Nitrogenous substances—				
Albuminoids	..	488	..	507
Non-albuminoids	..	76	..	76

First, in regard to yields, the average obtained from the crops of three successive seasons was one ton more per acre from the corn planted in drills. This increase in yield means 937 lbs. more of dry matter per acre, composed of 19 lbs. protein (albuminoids), 658 lbs. carbo-hydrates, 2 lbs. fat, 224 lbs. fibre and 34 lbs. ash.

In spite, therefore, of the slightly higher feeding value of the dry matter of the hill-grown corn (due to its containing more protein), more real cattle food was obtained per acre from the corn in drills, by reason of the latter giving a larger yield of fodder containing a higher percentage of dry matter.

We do not wish to exaggerate the differences here indicated in favour of planting in drills. Though significant, they are by no means large, and it is quite possible that with other varieties of corn they might be considerably modified. The general impression among those who have planted in both ways is that hill-grown corn produced the larger number of ears, and the analysis bears out this contention; the larger yield obtained from the drills, however, more than offsets this advantage.

Dent and Flint Varieties.—It will be remembered that two Dent and two Flint varieties were employed in this research, consequently the data obtained may serve to make a comparison between Dent and Flint corn as regards yield of fodder and the relative value of that fodder.

Composition of Corn Fodder, Dents and Flints, two Varieties of each from Drills and Hills, Average of 3 Years.

Constituents.	Fresh Material.		Dry Matter.	
	Dents.	Flints.	Dents.	Flints.
Water	80·22	79·64		
Dry matter	19·78	20·36		
Crude protein	1·41	1·63	7·23	8·12
Fat	0·78	0·09	0·35	0·44
Carbo-hydrates	11·54	11·91	58·19	58·99
Fibre	5·64	5·56	28·43	26·72
Ash	1.12	1·16	5·73	5·73
Nitrogenous substances, Albuminoids	1·24	1·41	6·35	6·91
Non-albuminoids	0·17	0·22	0·88	1·21

The fodder (fresh material) of the Flint varieties, compared weight for weight with that from the Dents, is seen to contain the larger amount of dry matter. The difference is not a large one, but the superiority of the 'Flint' fodder is still further emphasized by the fact that its dry matter is richer in albuminoids and possesses less fibre.

In the second table, to be found on page 168, we present the data of the yields and weights of nutrients per acre from the Flint and Dent varieties examined.

Indian Corn as grown in Hills and Drills. Composition of fresh material and water-free substance.

Variety.	Hills or Drills.	Date of Sowing.	Date of Collection.	Fresh Material.								Water-free Substance.						
				Water.	Fat.	Fibre.	Nitrogen-free extract.	Protein.			Ash.	Fat.	Fibre.	Nitrogen-free extract.	Protein.			Ash.
								Crude.	Albuminoids.	Non-albuminoids.					Crude.	Albuminoids.	Non-albuminoids.	
				p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.
Selected Leaming	Drills	May 28, 1901	Sept. 21, 1901	77·34	0·04	6·83	13·41	1·98	1·23	0·05	1·10	0·16	30·15	59·15	5·67	5·43	0·24	4·87
"	Hills	" 28, 1901	" 21, 1901	82·05	0·06	4·77	10·99	1·26	1·23	0·03	0·87	0·35	26·60	61·17	7·04	6·83	0·21	4·84
"	Drills	" 27, 1902	" 24, 1902	80·43	0·14	5·72	10·44	1·81	1·39	0·42	1·46	0·71	29·25	53·36	9·27	7·09	2·18	7·41
"	Hills	" 27, 1902	" 24, 1902	84·14	0·06	4·67	8·22	1·62	1·34	0·28	1·29	0·35	29·47	51·85	10·21	8·44	1·77	8·12
"	Drills	" 27, 1903	" 24, 1903	81·08	0·05	4·31	12·39	1·28	1·16	0·12	0·89	0·25	22·77	65·42	6·79	6·14	0·65	4·77
"	Hills	" 27, 1903	" 24, 1903	81·27	0·09	4·69	11·41	1·46	1·29	0·17	1·08	0·49	25·02	60·81	7·81	6·89	0·92	5·79
Mammoth Cuban	Drills	" 28, 1901	" 21, 1901	77·31	0·02	8·04	12·49	1·04	1·01	0·03	1·10	0·08	35·45	55·03	4·60	1·46	0·14	4·81
"	Hills	" 28, 1901	" 21, 1901	80·13	0·01	7·35	10·22	1·10	1·05	0·05	1·19	0·04	37·00	51·40	5·55	5·30	0·25	6·01
"	Drills	" 27, 1902	" 24, 1902	79·00	0·07	6·33	11·51	1·75	1·48	0·27	1·34	0·33	30·15	54·82	8·33	7·03	1·30	6·37
"	Hills	" 27, 1902	" 24, 1902	80·40	0·08	5·60	11·04	1·66	1·37	0·29	1·32	0·40	28·59	56·31	8·54	6·99	1·55	6·16
"	Drills	" 27, 1903	" 24, 1903	79·09	0·09	1·58	14·08	1·21	1·05	0·16	0·95	0·41	24·91	67·37	5·79	5·01	0·78	1·52
"	Hills	" 27, 1903	" 24, 1903	80·12	0·11	1·87	12·03	1·56	1·29	0·27	1·01	0·56	24·89	61·43	7·96	6·58	1·38	5·16
Longfellow	Drills	" 28, 1901	" 21, 1901	73·58	0·18	9·88	13·42	1·69	1·60	0·09	1·25	0·67	37·39	50·81	6·39	6·06	0·33	4·74
"	Hills	" 28, 1901	" 21, 1901	79·40	0·09	6·31	11·56	1·56	1·46	0·10	1·16	0·42	30·62	56·04	7·57	7·09	0·48	5·35
"	Drills	" 27, 1902	" 24, 1902	79·19	0·01	5·70	11·12	1·91	1·52	0·12	1·71	0·18	27·41	51·87	9·33	7·31	2·02	8·21
"	Hills	" 27, 1902	" 24, 1902	80·18	0·08	5·52	10·58	1·90	1·12	0·18	1·41	0·40	28·28	51·19	9·75	7·27	2·48	7·38
"	Drills	" 27, 1903	" 24, 1903	80·11	0·08	3·81	13·59	1·52	1·31	0·21	0·89	0·39	19·15	68·33	7·65	6·59	1·06	4·48
"	Hills	" 27, 1903	" 24, 1903	79·31	0·21	4·65	12·99	1·82	1·57	0·25	0·99	1·03	22·49	62·88	8·83	7·58	1·25	4·77
Canada White	Drills	" 28, 1901	" 21, 1901	79·00	0·13	5·84	12·10	1·78	1·63	0·15	1·15	0·62	27·80	57·62	8·19	7·75	2·74	5·47
"	Hills	" 28, 1901	" 21, 1901	75·76	0·01	8·28	12·82	1·69	1·61	0·08	1·44	0·03	34·16	52·83	7·03	6·64	0·39	5·95
"	Drills	" 27, 1902	" 24, 1902	80·11	0·04	5·35	11·48	1·52	1·24	0·28	1·20	0·18	27·29	58·59	7·74	6·31	1·40	6·20
"	Hills	" 27, 1902	" 24, 1902	81·65	0·08	4·57	10·92	1·62	1·26	0·36	1·16	0·45	24·90	59·53	8·85	6·85	2·00	6·27
Sanford	Drills	" 27, 1903	" 24, 1903	82·15	0·05	3·59	12·24	1·19	1·13	0·06	0·78	0·30	20·11	68·60	6·64	6·31	0·33	4·35
"	Hills	" 27, 1903	" 24, 1903	81·70	0·09	3·24	9·80	1·32	1·07	0·25	0·85	0·57	21·16	64·14	8·60	7·02	1·58	5·53

INDIAN CORN as grown in Hills and Drills. Yield and Weight of Nutrients per Acre.

Variety.	Hills or Drills.	Date of Sowing.	Date of Collection.	Weight of Crop.		Dry Matter.	Fat.	Fibre.	Nitrogen-free extract.	Protein.			Ash.
										Crude.	Albuminoids.	Non-Albuminoids.	
				Tons.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Selected Leaming.	Drills ..	May 28, 1901	Sept. 21, '01	22	..	9,970	18	3,005	5,900	563	511	22	484
" " .	Hills...	" "	" "	23	860	8,411	28	2,235	5,150	590	576	14	408
" " .	Drills ..	May 27, 1902	Sept. 24, '02	23	1,300	9,257	68	2,706	4,937	856	657	199	690
" " .	Hills...	" "	" "	17	980	5,548	21	1,634	2,875	567	469	98	451
" " .	Drills ..	May 27, 1903	Sept. 24, '03	17	1,970	6,806	18	1,559	4,453	460	417	43	320
" " .	Hills...	" "	" "	16	10	5,996	29	1,501	3,453	467	413	54	346
Mammoth Cuban.	Drills ..	May 28, 1901	Sept. 21, '01	19	940	8,836	8	3,131	1,864	405	393	12	428
" " .	Hills...	" "	" "	26	140	10,360	5	3,832	5,328	574	547	27	621
" " .	Drills ..	May 27, 1902	Sept. 24, '02	22	1,320	9,517	32	2,869	5,216	793	671	122	607
" " .	Hills...	" "	" "	17	1,640	6,986	29	1,996	3,934	592	488	104	435
" " .	Drills ..	May 27, 1903	Sept. 24, '03	19	1,600	8,280	36	1,811	5,575	479	416	63	376
" " .	Hills...	" "	" "	19	775	7,592	43	1,888	4,601	605	500	105	465
Longfellow.....	Drills ..	May 28, 1901	Sept. 21, '01	15	360	8,021	55	2,999	4,074	513	486	27	380
"	Hills...	" "	" "	20	40	8,248	36	2,527	4,620	625	585	40	440
"	Drills ..	May 27, 1902	Sept. 24, '02	22	1,320	9,432	18	2,583	5,177	879	689	190	775
"	Hills...	" "	" "	17	1,640	6,957	29	1,967	3,771	677	506	171	513
"	Drills ..	May 27, 1903	Sept. 24, '03	15	1,240	6,214	25	1,190	4,246	475	409	66	278
"	Hills...	" "	" "	14	1,260	6,045	61	1,361	3,800	533	459	74	290
Canada White....	Drills ..	May 28, 1901	Sept. 21, '01	18	1,540	7,946	49	2,210	4,578	674	617	57	435
" "	Hills...	" "	" "	17	100	8,266	3	2,824	4,372	576	549	27	491
" "	Drills ..	May 27, 1902	Sept. 24, '02	17	760	6,809	14	1,860	3,990	528	431	97	417
" "	Hills...	" "	" "	18	1,400	6,863	30	1,709	4,084	606	471	135	434
Sanford	Drills ..	May 27, 1903	Sept. 24, '03	15	1,570	5,636	16	1,153	3,865	376	357	19	246
"	Hills...	" "	" "	13	1,500	4,208	25	891	2,695	363	294	69	234

CORN FODDER, Dents and Flints—Two Varieties of each from Drills and Hills—Yield and Weights of Nutrients per Acre.

	Dents.		Flints.	
	Tons.	Lbs.	Tons.	Lbs.
Yield of crop.....	20	961	17	585
Dry matter.....	4	129	3	1,053
Crude protein	.....	589	.....	569
Fat....	.....	28	.....	30
Carbo-hydrates...	2	707	2	107
Fibre.....	1	346	.....	1,958
Ash	.....	469	.....	411
Nitrogenous substances—				
Albuminoids	.....	508	.....	483
Non-albuminoids...	.....	72	.....	81

Notwithstanding the better quality of the dry matter furnished by the Flint corns, the Dent varieties must certainly be considered as easily first from the standpoint of the value of the fodder produced per acre. Thus, the Dents gave an increase in yield of 3 tons 376 lbs., containing 1,076 lbs. of dry matter over the product of the Flint varieties. This increase in dry matter is chiefly in carbo-hydrates (660 lbs.) and fibre (400 lbs.), but also possesses a notable amount (20 lbs.) of the more valuable albuminoids.

RAPE, RAPE ENSILAGE, RAPE AND CORN ENSILAGE.

Rape is better known and more widely grown in Canada to-day than ever before, so that now it occupies an important position among the succulent forage crops.* Its use, so far, has been in the fresh condition, being consumed either on the field by the stock (sheep, swine and steers), or cut and used as a soiling crop. On account of its leaves crumbling to powder on drying, rape cannot be cured as hay, and by reason of its large percentage of water, it was considered unsuitable for ensiling. This latter, however, has been disproved by the experiments of Mr. Grisdale, the Agriculturist, who during the past season made ensilage solely of rape and also a mixture of corn and rape, both being found at the end of six months sound and very palatable to cattle. These ensilages were used in a feeding experiment by the Agriculturist, and the results obtained will be found in his report for the current year.

To supplement these results and to learn what changes might take place by the ensiling of the rape, certain analyses have been made. These analyses, further, allow us to compare the composition of fresh rape, rape ensilage, and an ensilage composed of half rape and half corn.

RAPE, Rape Ensilage and Rape and Corn Ensilage. (Results on the fresh material.)

Constituents.	Rape as put in the silo, Oct. 6, 1903.	Rape Ensilage, Mar. 18, '04.	Rape and Corn Ensilage, ½ Rape, ½ Corn, Mar. 18, '04.
	p.c.	p.c.	p.c.
Water	86·05	78·19	79·66
Crude protein	1·91	2·67	2·18
Fat	0·16	0·84	0·37
Carbo-hydrates	8·11	12·93	10·40
Fibre	2·33	2·00	5·29
Ash	1·44	3·37	2·10
Nitrogenous compounds (crude protein):			
Albuminoids	1·30	1·36	1·04
Non-albuminoids	0·61	1·31	1·14

First, comparing rape with rape ensilage, we notice that ensiling the crop has resulted in a large loss of water, increasing the percentage of total dry matter from 13·95 to 21·81. Weight for weight, then, we should expect the rape ensilage to have a considerably higher feeding value. This, of course, is not to be interpreted as meaning that the rape increases in value in the silo, that a given weight of green rape gives an equal weight of ensilage with an increased percentage of dry matter, for such is not the case. The fermentation that ensues in the silo necessarily means loss in certain of the nutrients (especially the carbo-hydrates); this is true of all ensiled crops. But comparing equal weights of green rape and rape ensilage, the latter is the much more valuable. This will be further apparent by continuing the comparison of the two analyses. In crude protein the ensilage is considerably the richer. This gain,

*For an account of the food value of this crop, see the article, 'The Chemistry of Rape,' in report of this Division for 1900. Bulletin No. 42 (Experimental Farm Series) furnishes information respecting its culture and use.

however, is more apparent than real, for by reference to the percentage of albuminoids —the part of the crude protein which has by far the greater feeding value—it is seen that it is practically identical with that of the rape. From this fact we may infer that in muscle-forming constituents the rape and its ensilage are of about the same value.

In carbo-hydrates (starch, &c.)—heat-producing constituents—the ensilage contains about one-third more, and it is in this, principally, that the greater feeding value of the ensilage lies. The fibre is almost the same in both. In fat the ensilage is higher, making it the more valuable. Lastly, as regards ash or mineral matter, the percentage in the ensilage is almost three times that in the fresh material. This does not arise, of course, from any creation of ash, but from the disappearance through decomposition of the organic constituents, leaving a higher percentage of the mineral matter.

The comparison of the rape ensilage with the rape and corn ensilage makes clear, from the chemical standpoint, the superiority of the former. In all the more valuable nutrients the rape ensilage is the richer; in fibre—the constituent of least value—the presence of the corn increases the amount in the mixed ensilage.

The average composition of corn ensilage may now be given for the purpose of comparison with the foregoing analysis of the rape and mixed ensilage.

Analysis of Corn Ensilage.

Water	79·1
Crude protein	1·7
Fat	·8
Carbo-hydrates	11·0
Fibre	6·0
Ash	1·4
	100·00

The corn ensilage, it is evident, is less valuable than either rape ensilage or that from rape and corn, in that it contains less crude protein. The difference is, of course, more marked between the rape ensilage and corn ensilage than between that of the mixed crops and the ensiled corn, but the difference is one of degree rather than of kind—the addition of corn increases proportionately the percentage of fibre while reducing that of the crude protein in the product. To sum up these considerations, there seems no doubt but that in both the rape and mixed ensilages we have a succulent feed of a more nutritious character than in an ensilage from corn alone, and this chiefly by reason of the nitrogenous character of rape and its low fibre content.

A consideration of the data calculated on a water-free basis, in other words, of the composition of the dry matter of the several materials, throws some light upon the nature and direction of the changes that take place on ensiling the rape.

RAPE, Rape Ensilage, Rape and Corn Ensilage. (Results on the water-free substance.)

Constituents.	Rape as put in the silo.	Rape Ensilage.	Rape and Corn Ensilage, ½ Rape ½ Corn.
	p.c.	p.c.	p.c.
Crude protein	13·72	12·25	10·75
Fat	1·14	3·86	1·84
Carbo-hydrates	58·14	49·27	51·05
Fibre	16·70	19·18	26·02
Ash	10·30	15·44	10·34
Nitrogenous compounds—			
Albuminoids	9·35	6·22	5·10
Non-albuminoids	4·37	6·03	5·65

The increase in the non-albuminoids and the concomitant decrease in the albuminoids that has followed upon ensiling the rape marks the most important change in the composition of the dry matter of the rape. This in conjunction with the destruction of a part of the carbo-hydrates necessarily increases the percentages of the fibre and ash. The changes are such as might have been expected and indicate a certain deterioration in the silo of the dry matter of the rape.

ROOTS.

Five years ago (1900) we began the study, from the chemical standpoint, of the relative feeding values of the more important farm roots. This work has been continued every season since that time. It has been instrumental in showing that as regards the percentages of dry matter and sugar, the two chief nutrients in determining the feeding value of roots, considerable differences may, and frequently do, exist between mangels, carrots, turnips, &c.; and, further, that between varieties of the same class similar differences may often be found. Of course, no two roots from the same seed and growing side by side are exactly alike in composition, but in this research a sufficient number of roots has been taken to practically eliminate the factors of size and individualism. It may also be remarked that in the endeavour to arrive at a knowledge of the various factors influencing the composition of these roots, the soil factor has, as far as possible, been also eliminated by growing the roots under experiment on ground of a very uniform character. The relative richness of the soil need not, therefore, be taken into account when comparing the roots of the same season with one another.

Influence of Inherited Qualities.—Differences of a well marked, and, to a certain degree, constant character undoubtedly exist between the varieties of a class. Thus, for instance, in mangels, for five years in succession, with varying seasonal and soil conditions, the 'Gate Post' has invariably proved itself richer in dry matter and sugar than the Giant Yellow Globe. We must conclude that such differences are due to inherited qualities.

Dry Matter and Sugar in Gate Post and Giant Yellow Globe Mangels.

—	1900.		1901.		1902.		1903.		1904.		Average of 5 Years, 1900-04.	
	Dry Matter.	Sugar in Juice.	Dry Matter.	Sugar in Juice.	Dry Matter.	Sugar in Juice.	Dry Matter.	Sugar in Juice.	Dry Matter.	Sugar in Matter.	Dry Matter.	Sugar in Juice.
	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.
Gate Post.....	11·14	6·15	9·41	4·15	13·90	9·39	12·93	7·38	12·64	7·62	12·00	6·94
Giant Yellow Globe...	8·19	2·64	9·10	4·08	10·24	5·24	10·89	6·17	9·24	5·26	9·53	4·68

These results show that the 'breed' factor is an important one. They open up a most interesting field for work in the improvement of roots—one which undoubtedly offers an opportunity for obtaining results of practical value to the farmer. The Vilmorins of Paris have already achieved a marked success in this research in the production of the so-called 'Sugar Mangels,' a cross between the sugar beet and the mangel. This root is far superior in feeding qualities to the ordinary mangels, and at the same time gives a very satisfactory tonnage to the acre.

Influence of Season.—The above table, further, may serve to illustrate the effect of the season upon the composition of the root. It would not be altogether correct

to ascribe the differences observable from year to year, entirely to climatic causes, but there can be no doubt that the percentage of sugar (the most valuable nutrient) is particularly influenced by the character of the season. It would seem from our observations that heavy rains and low temperatures in the late summer months had an injurious effect upon the sugar content of the root. From investigation with sugar beets it seems evident that ideal climatic conditions for sugar production include a comparatively low mean summer temperature, certainly not higher than 70° F., an evenly distributed but not excessive rainfall during May, June, July and August, and warm and moderately dry weather during September and October.

Analysis of Roots, C. E. F., Ottawa, 1904.

Variety.	Seeds Purchased from.	Water.	Dry Matter.	Sugar in Juice.	Average Weight of one Root.	
		p.c.	p.c.	p.c.	Lbs.	Ozs.
Mangels—						
Half Long Sugar Rosy	Vilmorin, Paris, France	86·52	13·48	8·70	2	2
Giant Sugar Mangel	Rennie, Toronto	86·08	13·92	9·18	1	15
Half Long Sugar White	Vilmorin, Paris, France	89·20	10·80	5·45	1	14
Giant Sugar White	Graham Bros., Ottawa	88·94	11·06	5·06	4	7
Giant Sugar Rosy	Rennie, Toronto	87·90	12·10	7·00	3	15
Gate Post Yellow	Bruce & Co., Hamilton	87·36	12·64	7·62	2	6
Gate Post Red	" "	88·53	11·47	6·56	2	14
Giant Yellow Globe	Rennie, Toronto	90·76	9·24	5·26	2	13
Mammoth Long Red	" "	87·45	12·55	6·65	2	10
Giant Yellow Intermediate	" "	90·36	9·64	4·75	2	5
Carrots—						
Guérande or Oxheart		89·47	10·53	3·44	1	6
Improved Short White	Steele, Briggs & Co., Toronto	89·59	10·41	3·00	1	6
Half Long Chantenay	Ewing & Co., Montreal	88·94	11·06	3·63	1	2
Turnips—						
Selected Purple Top	Steele, Briggs & Co., Toronto	89·17	10·83	2·73	3	11
Good Luck Swede	" "	89·33	10·67	1·11	3	4
New Century	Graham Bros., Ottawa	88·08	11·92	2·51	3	11
Skirvings	Kenneth McDonald, Ottawa	88·14	11·86	2·11	3	1
Sugar Beets—						
Wanzleben	Berlin Sugar Works	77·88	22·12	15·40	1	4

Mangels.—Ten varieties of mangels were examined. The lowest percentage of dry matter was 9·24; the highest, 13.92; the difference is 4·68 per cent, or practically 33 per cent of the total dry matter. In sugar, the percentages vary from 4·75 to 9·18, or a difference of 4·43 per cent, equivalent to 49 per cent of the total sugar.

The 'Sugar Mangels,' the first six given in the table, as in past years, are characterized (with one exception) by an excellent dry matter and sugar content. These are followed by the variety known as Gate Post, including the Mammoth Long Red which is probably the same mangel under another name. The Giant Yellow Globe and Giant Yellow Intermediate close the list with less dry matter, though showing a very fair proportion of sugar.

Carrots.—The Ox-heart and Improved Short White have given results practically identical as regards dry matter, and very close as regards sugar. The Half Long Chantenay is somewhat richer than these in both respects.

It will be observed that, taken as a class, carrots do not furnish the same amount of dry matter as mangels, and fall considerably below the latter in respect to sugar content.

Turnips and Swedes.—Four varieties were analysed. Of these, the New Century stands highest, both in respect to dry matter and sugar, closely followed by Skirvings.

The Good Luck Swede, though practically equal to the Selected Purple Top in dry matter, possesses a very much lower proportion of sugar. Though comparing very favourably as a class with carrots in dry matter, they are not quite so rich in sugar.

Sugar Beets.—An example of the Klein Wanzleben, grown for feeding purposes, is added in order to show the vast differences in composition that exist between sugar beets and the ordinary field roots

LINSEED OR OIL CAKE.

A sample of oil cake, manufactured by the Canada Linseed Oil Mills, Montreal, and sold as the 'Maple Leaf' brand, has been submitted to analysis. It is stated as being made by the 'old process'—hydraulic method.

The following data were obtained :—

Analysis.

	Per cent.
Moisture	11·29
Protein	32·00
Fat or oil	6·38
Carbo-hydrates	36·84
Fibre	8·25
Ash	5·27
	100·00

Oil cake is widely recognized as a 'concentrate' of great value, both from its high protein content and its large percentage of oil. It is, therefore, unnecessary to say more than that the above figures are in close accord with those obtained in the Farm Laboratories from samples of unadulterated, good quality 'old process' linseed cake.

GLUTEN FEED.

The various by-products of the corn starch factory have been discussed in considerable detail in former publications and their relative feeding values pointed out. At first these products were sold separately, and inspection only was needed to determine, approximately, the nature and value of the material offered for sale. This is scarcely possible now, for all the by-products (with the exception of the germ) are mixed together and sold as Gluten Feed. This should not be confounded with Gluten Meal, which was formerly upon the market and contained about 35 per cent protein and from 8 to 11 per cent fat. It is stated that Gluten Feed is by some being sold as Gluten Meal; this, of course, is distinctly fraudulent. Gluten Meal has, we believe, entirely disappeared from the market, but whether such be the case or not, it is desirable that farmers should know that Gluten Feed is the product now offered them, and that it will contain 10 to 13 per cent less protein and 6 to 8 per cent less fat than the Gluten Meal they were accustomed to use.*

Thus, we may place side by side analysis made of Gluten Meal two years ago and of Gluten Feed received a few weeks ago, both being from the Edwardsburg Starch Co.:

*Since writing the above, and just as this report is going to press, we have received a letter from the Edwardsburg Starch Co. stating that they have a true 'Gluten Meal' upon the market.

	Gluten Meal. Per cent.	Gluten Feed. Per cent.
Moisture	5·25	3·68
Protein	36·38	23·00
Fat or oil	11·05	2·83
Carbo-hydrates	43·83	63·79
Fibre	1·54	5·75
Ash	1·55	·95
	100·00	100·00

The difference between these two in feeding value is at once apparent. The Gluten Meal was sold at $25 to $30 per ton, and the price of the Gluten Feed this year was about $22 per ton. We have no hesitation in saying that the Gluten Meal was much the better value at these prices.

COTTON-SEED MEAL.

This feeding stuff is used largely in the maritime provinces and, as we have pointed out in several of our past reports, great differences in feeding value exist between the brands found upon the market. We have, further, found that the prices are not in accordance with the quality, so that frequently of two meals offered the price of the inferior brand may be only a few dollars, or even a fraction of a dollar per ton less than that of a brand worth, from the feeding standpoint, one-third more. It is for these reasons that we have repeatedly urged that such products be sold under a guarantee stating the amount of protein and fat present. (See page 143, Report of Experimental Farms, 1903.) Until such time that farmers are so protected it has been thought desirable to submit to analysis such samples as might be forwarded. Among these many have proved of excellent quality, with the proportions of protein and oil found in genuine meals. On the other hand, not a few samples have been shown to be of inferior quality. Thus, genuine grades should contain from 42 to 44 per cent protein, and from 9 to 11 per cent oil, and data have been obtained recently from samples received showing a protein content ranging from 19 to 35 per cent, and from 5 to 7·5 per cent of oil.

With respect to the genuine cotton-seed meals, it is evident from our work that the methods now employed extract more of the oil than was the custom, and thus, while reducing the oil-content, tend to increase the percentage of protein.

An analysis is absolutely necessary to determine the percentages of protein and fat (the constituents of greatest importance from the feeding standpoint) a meal may contain, but it will be of assistance to farmers to know that genuine meals are of a bright yellow colour, while inferior grades are much darker and show on closer inspection many fragments of hull intermixed with the finer meal.

UVECO AND FLAKERINE.

These are 'cooked' foods, manufactured by the Uveco Cereals Co., Ltd., Newport, Monmouthshire. Quantities of each were received for trial, the Uveco being intended for cattle, the Flakerine for poultry. In appearance they are not at all dissimilar (though with a little practice they can be distinguished), and give the impression that they consist largely, if not solely, of Indian corn which has been steamed or partially cooked, rolled into flakes and dried. They are bright, clean-looking feeds, with a pleasant, slightly sweetish taste.

Analysis.

	Uveco. Per cent.	Flakerine. Per cent.	*Cornmeal. Per cent.
Moisture	9·75	11·50	15·0
Protein	8·94	12·43	9·2
Fat	3·89	2·37	3·8
Carbo-hydrates	74.62	69·71	68·7
Fibre	1·48	2·22	1·9
Ash	1·32	1·77	1·4
	100·00	100·00	100·00
Aqueous extract:			
Total solids, soluble in cold water	4·76	8·16	
Containing dextrine	4·51	6·13	

It will be observed that both Uveco and Flakerine contain somewhat less water than corn meal and this, of course, is in their favour. Uveco is considerably the drier of the two.

In protein and fat, the two most valuable nutrients, Uveco (notwithstanding its higher percentage of dry matter) is practically identical with corn meal, and the same may almost be said with regard to the amounts of fibre and ash present. The only difference of moment, therefore, between Uveco and Indian corn meal appears to be that the former contains a larger percentage of carbo-hydrates (starch, &c.), a part of which by the cooking process has been converted into dextrin, which, unlike starch, is soluble in cold water.

Flakerine is considerably richer in protein than Uveco, though poorer in fat. Its percentage of carbo-hydrate is very close to that of Indian corn meal, but a greater proportion has been made soluble by cooking than in the case of Uveco, as evidenced by the larger percentages of extractive matter and dextrin.

While admitting the great palatability of these foods, it is very doubtful if their real feeding value, so far as most classes of stock are concerned, has been enhanced by the cooking process. Many experiments have been made to ascertain the effect of cooking and boiling on foods, and the results show most decidedly that in the majority of instances their digestibilty has not been increased. Very seldom have the practical returns in gains been sufficient to warrant the necessary expense of cooking, and consequently it can only be recommended when it is desirable to render the foods more palatable. Henry in his work on Feeds and Feeding, sums up the discussion on this matter in these words: 'As a general proposition, it may be stated that it does not pay to cook food for stock when such food will be satisfactorily consumed without cooking, for cooking does not increase the digestibility of feeding stuffs, but may lower it, and there is considerable expense involved in the operation.'

It is scarcely necessary to point out that neither Uveco nor Flakerine belong to that class of concentrated by-products which is characterized by a high protein content (Oil Cake, Gluten Meal, Cotton-seed Meal, &c.) and, therefore, cannot be used with economy when the intention is merely to enrich the ration in this constituent.

MEAT MEALS FOR POULTRY.

Among the nitrogenous foods which we now find being used by poultrymen, the various 'meat meals' take a prominent place. Their high protein content makes them

*The analysis of corn meal (average of FF samples), taken from Jenkins & Winton's tables, Washington, D.C., has been added in order to allow a comparison to be made between these feeding stuffs and corn meal.

particularly valuable for supplying to the animal system that nutrient (protein) required alike for egg and flesh production, and which is not found to any large degree in most grains. Moreover, the use of a ration composed exclusively of grain is very apt to lead to an excessive deposition of fatty tissue—and this is undesirable in both laying and fattening stock. The recognition of this has led in recent years to the mixing of a certain amount (usually about one-eighth) of these meat meals with the grain portion of the ration, and this practice has been followed by most gratifying results, especially during winter, and in the summer when the fowls can only be allowed a very small run. Further, the products of the packing house are frequently rich in bone, which, as most poultrymen know, is, when fresh and untainted, one of the best foods for laying hens.*

There are several brands upon the market, varying in price and in quality, and inquiries are being constantly received as to their respective values to the poultry feeder. We have accordingly submitted to analysis such of these as are being used by, or could be procured by Mr. Gilbert, Poultry Manager, Central Experimental Farm. They comprise:—

Beef Scrap No. 1, Cyphers Incubator Co., Buffalo.
Beef Scrap No. 2, Cyphers Incubator Co., Buffalo.
Darling's Beef Scrap " "
Superior Meat Meal, W. A. Freeman Co., Ltd., Hamilton, Ont.
Meat Meal, A. J. Morgan, London, Ont.

Of Beef Scrap No. 1, two samples were examined, obtained a month apart and from different sources.

Analysis of Meat Meals.

Brand.	Moisture.	Protein.	Fat.	Total Ash.	Ash Insoluble in Acid, Sand, &c.
	p.c.	p.c.	p.c.	p.c.	p.c.
Beef Scrap No. 1, Cyphers	7·21	54·50	14·68	19·34	·85
" "	10·52	52·38	15·19	17·29	1·33
" No. 2, Cyphers	5·28	38·75	21·80	31·61	·12
Darling's Beef Scrap	6·67	52·81	13·11	21·91	·99
Superior Meat Meal, Freeman	7·06	45·06	12·45	30·10	·35
Meat Meal, Morgan	5·74	35·19	11·31	40·67	·50

Moisture.—Meat meals by reason of their high nitrogen content are, if at all moist, very susceptible to change of a deleterious character, to become tainted and infested with mites, &c. The drier a meal is the better it will keep. It is advisable for poultrymen to examine critically any meat meal they may be purchasing; it should be sound and dry. Examination with a pocket lens is necessary to detect insect life, which, if present, indicates a certain degree of decay.

With the exception of one of the samples of Beef Scrap No. 1, all are excellent as regards moisture-content. The sample referred to, it is only right to say, was not obtained directly from the manufacturer and may have absorbed moisture through undue exposure.

Protein.—This is the most important of the nutrients, and provided the meal is sound and the source of the protein wholesome and digestible, the value of a meal should be very largely regulated by the percentage present.

* Remarks on the general principles of Poultry feeding and the relative values of different foods and rations, may be found on page 213, 219, Experimental Farms Reports, 1902.

Owing to the difficulties in manufacturing a product of this character that shall not vary in composition, it becomes necessary in considering analyses of the same to overlook small differences. Further, the mechanical condition of these meals makes it an exceedingly hard matter to sample accurately—and irregularities of sampling, of course, become apparent in the subsequent analysis. We may, however, safely divide the meals examined into three classes, according to their protein content.

Class I—50 pr cent to 55 per cent Protein—Beef Scrap No. 1, Cyphers, Darling Beef Scrap.

Class II.—45 per cent to 50 per cent—Superior Meat Meal, Freeman.

Class III.—35 per cent to 40 per cent—Beef Scrap No. 2, Cyphers, Morgan's Meat Meal.

Fat.—This is also a valuable constituent, serving alike as a source of fat in the body and for the production of animal heat, but a large percentage is not desirable in poultry meat meals. In the brands analysed, this nutrient varies from 11 to 22 per cent. In comparing these meals, using the tabulated data, we would impress upon the reader that it is not desirable to have protein replaced by fat; in other words, a high protein content with a moderate percentage of fat will give better results than a meal containing a minimum of protein and a large percentage of fat.

Ash.—The two last columns of the table allow us to form some opinion of the amount of bone present. The proportion of this material undoubtedly affects the value of the meal when used for laying stock.

We may, for our present purpose, consider bone to consist of, approximately:

Organic matter (nitrogenous and fatty) and moisture, 40 per cent.
Mineral matter (chiefly phosphate of lime), 60 per cent.

On this assumption and, further, supposing that the differences between the data of columns 4 and 5 of the table represent the mineral matter furnished by the bone present, we obtain the following approximate percentages of bones in the various brands:—

Beef Scrap No. 1, approximately	30	per cent. bone
Beef Scrap No. 2 "	50	"
Darling's Beef Scrap "	35	"
Superior Meat Meal "	50	"
**Morgan's Meat Meal "	?	"

The very small percentages of 'insoluble ash' make it very plain that in no instance was sand present, either intentionally or by accident.

MILLING PRODUCTS FROM PEASE, OATS AND BARLEY.

Attention has repeatedly been called to the desirability of some official system of inspection and analysis of concentrated feeding stuffs as sold in Canada and which will, further, necessitate the manufacturer or vendor of these products to attach to each bag or consignment a tag bearing a guarantee of the amounts of protein and fat contained by the feed. Such a plan has long been in force with regard to the essential elements of plant food in fertilizers and the ever increasing number of milling by-products now in the market makes it equally important that a similar method be adopted for them. This matter was discussed at some length in our report for 1903,

**This brand effervesces strongly on the addition of acid, showing the presence of a carbonate. It is the only one of the number analysed that so reacted. By reason of this carbonate (probably carbonate of lime) the method here employed for estimating the amount of bone present cannot be applied.

and is only here again brought forward for the reason that recent analyses have furnished an excellent illustration of the force of this contention.

In the early part of the present year a quantity of several such materials was bought from a miller in western Ontario for use in feeding experiments at the Experimental Farm, Ottawa. These on arrival were sampled and analysed and the results are to be found in the subjoined table. Together with the analytical data, the name under which the product was bought, and the price paid are stated:

	Water.	Protein.	Fat.	Carbo-hydrates.	Fibre.	Ash.
	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.
Pea meal, ground pea chips ($25 per ton)	8·02	25·91	2·19	61·19	·20	2·49
Pea dust ($22 per ton)	8·37	26·16	2·77	48·70	10·28	3·72
Ground pea bran ($14 per ton)	8·01	28·53	2·89	48·44	8·11	4·02
Barley feed ($14 per ton)	8·57	12·12	4·34	59·60	10·87	5·10
Meal seeds ($12 per ton)	5·67	7·09	3·83	60·05	19·17	4·19
Oat dust ($5 per ton)	4·81	9·59	3·77	52·13	24·60	5·10

It is quite unnecessary to enter into any detailed discussion of these results in order to make good the point under consideration. A casual review of them with references to the percentages of protein and fat will be sufficient to assure the reader that in most instances the food values and the prices of these feeds are not in accord. Thus, the Ground Pea Bran at $14 per ton contains more protein than the Pea Meal which is quoted at $25 per ton. Again, the 'Meal Seeds' at $12 per ton is poorer in protein than the Oat Dust at $5 per ton. Similar differences are observable between many of the other feeds, and throughout the whole series there is no direct relationship between prices and feeding value. We do not wish it to be inferred that any fraud was intended by this manufacturer; these discrepancies between price and value are, without doubt, the result of ignorance on the part of the manufacturer as to the nature of what he is selling, but they serve, as we have said, to illustrate admirably the desirability of official analysis and the selling of these products with a statement as to their composition attached.

RAISINS.

At the request of the Poultry Division, Department of Agriculture, we submitted to analysis a sample of spoiled raisins, the object being to ascertain if they were of any value as a poultry food. A comparatively large quantity could be purchased at a very low rate (our correspondent writes) and it is interesting to know how they compare with grain (oats or wheat) at the same price—say 1 cent per pound.

Analysis.

	Per cent.
Moisture	7·86
Crude protein	5·19
Fat	3·39
Carbo-hydrates	72·44
Fibre	6·71
Ash	4·41
	100·00

This could not be regarded as of any considerable value either for egg or flesh production as the crude protein is very low—not quite half that present in oats or

wheat, for instance. No doubt a considerable part of the carbo-hydrates is glucose or grape sugar, the function of which in the animal economy is the production of heat and energy, and to some extent, the formation of fat. We do not, however, think that this would prove a satisfactory poultry food even at 1 cent per pound.

GROUND SEEDS.

A sample under the above name was received from Joseph C. King & Co., Port Arthur, Ont. It was in the form of a fine meal, and results, we presume, from the grinding together of the weed seeds, screenings, &c., from cleaning grain.

Analysis.

	Per cent.
Moisture	8·14
Protein	15·12
Fat	8·77
Carbo-hydrates	49·12
Fibre	13·15
Ash	5·28
	100·00

Compared with bran, this product contains about an equal amount of protein and about 3 per cent more fat. It is, however, about 3 per cent higher in fibre.

Provided this feed is found to be palatable, no objection can be urged to its use. The fineness to which it is ground precludes the possibility of any dissemination of weeds over the farm in the resulting manure.

HERBAGEUM.

At the request of several correspondents, an analysis of this well advertised condimental food has been made. It is manufactured by the Beaver Manufacturing Co., Galt, Ont., and its use is stated to 'ensure true economy in the production of milk, flesh, butter, cheese, poultry and eggs.'

Analysis.

	Per cent.
Moisture	6·70
Protein	22·94
Fat	6·98
*Carbo-hydrates	40·61
Fibre	7·86
**Ash	14·91
	100·00

Microscopic examination shows it to consist largely of linseed meal and bran or some other wheat refuse. It also contains, in addition to the salt and sugar stated above, fenugreek and charcoal.

Its price, 4 lbs., 60c., 100 lbs., $12, precludes its consideration as a feeding stuff—and in this connection it may be pointed out that its value as such cannot be equal to oil cake meal. We must, therefore, look upon it largely as a tonic or condiment and suppose that the high price for which it is sold is placed upon it for its (alleged) medicinal properties. But viewed either as a food or medicine, or both, it is altogether

* Including sugar, 2·22 per cent. ** Including salt, 10·17 per cent.

too dear. All its constituents are of a cheap character and the mixture, if desired, could be made at a very much lower figure.

Without denying that such condimental foods may be useful at times, the continuous or general employment of them, as is so frequently practiced, is quite unnecessary and uneconomical. Animals that are in good health and thrifty do no better from the addition of such 'tonics' to their ration—this is the conclusion reached by careful experiment—and it becomes a question whether it would not be far cheaper and better to treat stock that are out of condition as their ailments require.

SUGAR BEETS, FOR FACTORY PURPOSES.

Examples of roots from the three best varieties of sugar beets, Vilmorin's Improved, Klein Wanzleben, and Très Riche (French 'Very Rich'), as grown on the Experimental Farms during the last season, have been analysed.

SUGAR Beets grown on the Dominion Experimental Farms, 1904.

Variety.	Locality.	Percentage of Sugar in Juice.	Percentage of Solids in Juice.	Co-efficient of Purity.	Average Weight of one Root.	
					Lbs.	Oz.
Vilmorin's Improved	Nappan, N.S.	15·59	20·04	77·8	1	4
"	Ottawa, Ont.	16·59	18·50	90·2		14
"	Brandon, Man.	16·66	20·49	81·7	1	3
"	Indian Head, N.W.T.	14·87	18·00	82·6	1	2
"	Agassiz, B.C.	7·03	12·13	57·9	1	2
Klein Wanzleben	Nappan, N.S.	13·83	18·03	76·7	1	10
"	Ottawa, Ont.	16·92	19·34	87·5		14
"	Brandon, Man.	16·65	20·50	81·2	1	6
"	Indian Head, N.W.T.	15·96	19·50	81·8	1	2
French 'Very Rich'	Nappan, N.S.	13·82	18·89	73·2	1	5
"	Ottawa, Ont.	17·24	20·01	85·7	1	5
"	Brandon, Man.	16·56	19·68	84·1	1	8
"	Indian Head, N.W.T.	14·89	18·03	82·6	1	4
"	Agassiz, B.C.	8·17	13·13	62·2	1	2

SUGAR Beets grown on the Experimental Farms, 1904—Particulars of Growth.

Locality.	Date.		Distance Between.		Remarks.
	Sowing.	Pulling.	Rows.	Plants in Rows.	
			Ft. In.	In.	
Experimental Farm—					
Nappan, N.S.	May 30.	Oct. 12.	2 0	12	Light clay loam, manured at rate of 25 one-horse cart loads per acre.
Ottawa, Ont.					
Brandon, Man.		Sept. 24.	3 0	12	Rich black sandy loam, manured three years ago with barn-yard manure at the rate of 10 loads to the acre.
Indian Head, N.W.T.	May 27.	Oct. 6.	2 4	8	Clay loam, 10 loads rotted manure to the acre.
Agassiz, B.C.	April 25.	" 24.	2 6		

Nova Scotia, Nappan.—The beets of this farm are perceptibly of lower quality than those of last year. This is noticeable in the sugar content, but more particularly so in purity. The average percentage of sugar in the three varieties tested, for 1903, was 15·33, with a co-efficient of purity of 81·3; for the present season, the averages are 14·41 and 75·8, respectively.

It will be observed that as regards both sugar content and purity, Vilmorin's Improved is the best. Klein Wanzleben and Très Riche give results practically identical and are somewhat less valuable for factory purposes.

Ontario, Ottawa.—Both as regards sugar content and purity, the results are considerably in advance of those of 1903, due, undoubtedly, to the more favourable character of the past season. They indicate a beet in all respects eminently suitable for sugar extraction.

The following data will allow a comparison of these varieties for the past three years, as grown on the Experimental Farm, Ottawa.

	Sugar in Juice, per cent.	Co-efficient of Purity.
Vilmorin's Improved—		
1902	17·26	87·0
1903	15·61	92·0
1904	16·59	90·2
Klein Wanzleben—		
1902	17·84	91·5
1903	15·12	86·9
1904	16·94	87·5
Très Riche (French 'Very Rich')—		
1902	15·81	89·1
1903	Not grown.	
1904	17·24	85·7

The results not only indicate the high character of these varieties for factory purposes, but furnish an excellent illustration of the effect of the season upon the sugar content of the beet. In 1903, it will be noticed, there was a considerable falling off in the percentage of sugar, compared with the results of 1902 and 1904. This was due, no doubt, to the exceptional climatic conditions that prevailed that season (1903), a protracted drought in the spring followed by heavy and continuous rains in the autumn. These rains induced a second growth of the root at a time when the storing up of sugar more particularly takes place and for which, if the sugar content is to be satisfactory, warm, dry weather is essential.

Manitoba, Brandon.—For several years past sugar beets from Manitoba, as grown at Brandon and in the neighbourhood of Winnipeg, have been analysed, but we have never before been able to report—save in what might be called one or two exceptional cases—very favourably. Thus in 1903, Vilmorin's Improved gave only 11·36 per cent sugar in juice and 73·7 co-efficient of purity. Reference to the foregoing table, however, shows the beets as grown on the Experimental Farm, Brandon, this year to be of excellent quality. Mr. Bedford, the superintendent, on being informed of the results, writes: 'I was not aware that the season had been particularly favourable to a high sugar content, but nearly all field roots with us have given above an average yield.'

North-west Territories, Indian Head.—In all three varieties a very satisfactory sugar content was obtained. The percentages of sugar are slightly lower than those for 1903, but are sufficiently high for factory purposes.

British Columbia, Agassiz.—The two varieties received this year from the Experimental Farm at Agassiz, Vilmorin's Improved and Très Riche, were very poor in

sugar content, with a corresponding low co-efficient of purity. In 1903, excellent beets were grown here, showing a very satisfactory sugar content. Mr. Sharpe reports 'a very poor season (1904) for mangels, carrots, and sugar beets,' so we must suppose the present unsatisfactory results have been due to specially unfavourable climatic conditions.

CHEMISTRY OF THE SUGAR BEET.

Within the last few years, as is well known, there has been a revival in certain centres in the Dominion of the beet sugar industry, and factories are now in operation at Berlin and Wallaceburg, Ontario, and at Raymond, Alta, N.W.T.

The commercial success of the undertaking at any point depends very largely on obtaining an adequate supply of beets. It is necessary, if the extraction of the sugar is to be profitable and the return to the farmer a lucrative one, not only that the beets be up to a certain standard of richness and purity, but also that the tonnage available, in other words, the acreage be sufficiently large. According to the size of the 'plant' or factory so will the tonnage be necessary for its profitable operation, but we may safely assume that not less than 30,000 tons will be required for a modern factory—one Ontario factory stated 40,000 tons as a minimum, and another, 50,000 tons. If we allow a yield of 10 tons per acre (the average over large areas is somewhat less), the area under beets, within reasonable distance of a factory necessary to satisfactorily supply its requirements, will be from 3,000 to 5,000 acres. These considerations and the further fact that on some part of the farm the crop must be grown annually (or otherwise there will be a shortage of beets for the factory), have led to many inquiries as to the effect of the sugar beet on the soil, i.e., as regards the exhaustion of the more essential elements of plant food.

To answer these inquiries we have submitted to analysis beets—roots, collars or crowns and leaves, separately—at three stage of growth, determining, among other constituents, the percentages of nitrogen, phosphoric acid, potash, and lime present. The variety selected was Klein Wanzleben and the collections were made on July 29, September 8, and October 19. The soil of the plot (Experimental Farm, Ottawa) was a fairly rich, warm, well drained sandy loam.

Immediately on taking the samples the beets were cleaned and the proportions (by weight) of the leaves, collars, and dressed roots (as ready for the factory) determined.

PROPORTION of Leaves, Collars and Roots in Sugar Beets.

Date of Collections.	Leaves.	Collars or Crowns.	Roots.
First collection, July 29	68·3	6·4	25·3
Second " Sept. 8	46·4	12·7	40·9
Third " Oct. 19	37·8	11·4	50·8

The proportion of the dressed root had increased from 25·3 per cent to 50·8 per cent between July 29 and October 19 (practically an increase of 100 per cent), while the relative weight of leaves had decreased from 68 per cent to 37 per cent, or 44·6 per cent. The proportion of crowns or collars, the part from which the leaves spring and which with the leaves is left on the ground when dressing the beets for the factory, increased from 6·4 per cent to 12·7 per cent, practically 100 per cent, between the dates of the first and second collection. On October 19, when the last collection was made the proportion of collar was somewhat less, viz., 11·4 per cent.

The composition of the leaves, collars and roots as regards water, organic matter, and ash, on the several dates of collection, is shown by the following data :—

Analysis of Sugar Beets.

Date of Collections.	Leaves.			Collars or Crowns.			Roots.		
	Water.	Organic Matter.	Ash.	Water.	Organic Matter.	Ash.	Water.	Organic Matter.	Ash.
First collection, July 29	92·16	5·96	1·88	84·21	14·59	1·20	86·38	12·71	·91
Second " Sept. 8	89·16	8·74	2·10	80·95	17·59	1·46	82·12	16·97	·91
Third " Oct. 19	87·58	10·10	2·32	79·59	19·22	1·28	80·70	18·50	·80

Leaves.—These show a general and continuous increase in organic matter and ash constituents throughout the growing period.

Compared, weight for weight, with the collars and dressed roots, the leaves are considerably lower in organic matter, but decidedly higher in ash. This is true at all three periods of growth at which the examination was made.

Collars or Crowns.—These also show a continuous increase in organic matter, though the increase is not so marked as in the leaves. On July 29 the percentage of organic matter was almost three times that of the leaves. On the two last dates of collection it was practically twice that of the leaves.

Compared with the dressed roots, the collars are invariably the higher (from 1 per cent to 2 per cent) in organic matter.

The percentage of ash is intermediate between that of the leaves and that of dressed roots, but unlike that in the leaves does not uniformly increase. The results seem to show a slight increase between July 29 and September 8, but a decline from that date till October 11, practically to the percentage present on July 29.

Roots.—As regards organic matter, we find a marked increase throughout the whole period. The percentage of ash remained the same from July 29 to September 8, and fell off a little from the latter date till October 19.

FERTILIZING CONSTITUENTS IN THE BEET.

Proceeding to a discussion of the essential elements of fertility present in the roots, collars and leaves, respectively, we may first consider briefly the data of the following table, which gives the percentages of phosphoric acid, potash, lime and nitrogen, in the fresh material :—

Fertilizing Constituents in Sugar Beets (in fresh material).

Dates of Collection.	Leaves.				Collars or Crowns.				Roots.			
	Phosphoric Acid.	Potash.	Lime.	Nitrogen.	Phosphoric Acid.	Potash.	Lime.	Nitrogen.	Phosphoric Acid.	Potash.	Lime.	Nitrogen.
1st collection, July 29	·051	·563	·129	·231	·106	·382	·038	·194	·086	·493	·068	·148
2nd " Sept. 8	·065	·716	·184	·249	·111	·354	·042	·221	·115	·366	·052	·138
3rd " Oct. 19	·110	·823	·211	·279	·132	·303	·062	·271	·106	·338	·046	·187

Leaves.—As might have been expected from the already observed continued increase in organic matter and ash, the percentages of all these elements increase.

Weight for weight, the leaves are very much richer in potash than either the collars or dressed roots, and the percentage of this element, it will be noticed, makes a very marked advance as the season progresses.

The same tendency is to be observed in the case of the phosphoric acid and lime and nitrogen. It is thus seen that the older leaves, compared weight for weight, contain much more soil-derived plant food than the younger.

Collars or Crowns.—Here we find a slight increase in the percentages of phosphoric acid and lime, but a falling off in the potash.

The percentage of nitrogen shows a notable increase in this part of the beet as the plant grows.

Roots.—As the season advances, the following changes are to be noted: The phosphoric acid slightly increases; the potash shows a slight, but more apparent decrease; the nitrogen apparently increases, though the gain is a small one.

A review of the foregoing data when calculated on the dry matter (water-free material) reveals certain interesting facts:

FERTILIZING Constituents of Sugar Beets: Calculated on Water-free material.

Dates of Collection.	Leaves.				Collars or Crowns.				Roots.			
	Phosphoric Acid.	Potash.	Lime.	Nitrogen.	Phosphoric Acid.	Potash.	Lime.	Nitrogen.	Phosphoric Acid.	Potash.	Lime.	Nitrogen.
1st collection, July 29	·646	7·18	1·64	2·95	·670	2·42	·24	1·23	·637	2·96	·50	1·09
2nd " Sept. 8	·60	6·61	1·70	2·30	·584	1·86	·22	1·16	·643	2·05	·18	·77
3rd " Oct. 19	·888	6·63	1·70	2·25	·643	1·48	·30	1·32	·549	1·75	·24	·97

Leaves.—Neglecting slight differences, the dry matter of the leaves remains fairly constant throughout the season (July-October) in phosphoric acid and lime.

In potash and nitrogen the percentages decrease perceptibly, more particularly during August. During September there is but little change. It is evident, therefore, that the increase of these constituents before noted as appearing in the fresh leaves, is due to the larger amount of dry matter contained in the leaves as the plant reaches maturity, rather than to any enrichment of that dry matter. This points to the greater absorption of these constituents from the soil in the early stages of growth than subsequently.

Collars or Crowns.—The phosphoric acid and lime do not vary to any large degree, but the percentage of potash falls away very considerably as the plant approaches maturity. The nitrogen suffers slight change, but the direction of the change is not well marked.

Roots.—The most notable fact to be observed is the large decrease in potash content, as the season advances, evidently due in a large measure to relatively less potash being absorbed in the later months of the season and the fact that it is particularly during this latter period that the sugar is developed, thus, as it were, diluting the mineral constituents in the root. The lime is reduced to about one-half, from July to October, very probably the causes being those just stated. There are minor fluctuations of the other constituents, but they are not sufficiently marked to allow of hard and fast deductions being made as to the general trend in content of these elements in the dry matter as the beet ripens.

FERTILIZING CONSTITUENTS PER ACRE.

From the practical standpoint of the beet grower, who naturally wishes to know the amounts of fertilizing constituents taken from the soil and contained in the different parts of the beet at the various stages of growth, the data of the concluding tables will prove of interest and value. The results will also prove useful in a consideration of those fertilizers that it may be necessary to employ for the sugar beet crop, and at the same time maintain the soil's productiveness.

To obtain them we have employed the foregoing data and the weights of the various parts taken from an equal number of beets at date of collection, the only assumption entering into the calculation being that of 10 tons per acre of dressed roots at maturity.

WEIGHT per Acre of the different parts of the Sugar Beet: Computed on the basis of 10 Tons of Dressed Roots, October 19.

Dates of Collection.	Leaves.		Collars.		Roots.	
	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
First collection, July 29	4	1,381	..	879	1	1,475
Second " Sept. 8	9	1,702	2	1,392	8	1,367
Third " Oct. 19	7	872	2	479	10	..

In spite of the large increase in the weight of the dressed roots per acre during the period, September 8 to October 19 (due chiefly to the development of sugar), the total weight of the crop is less on the latter than on the former date. The weights, respectively, are 21 tons, 461 lbs. on September 8, and 19 tons, 134 lbs. on October 19. This is explained chiefly by the drying out of the leaves; the loss of the weight of water in this way being greater than the gain in weight of sugar. It may in a small measure be also due to the breaking off and falling away of certain of the more mature leaves. This would not only lessen the weight of crop at this date, but also reduce the amounts of the fertilizing constituents contained in the crop at this period, and thus explain a certain small decrease in weight of potash per acre noticeable between September 8 and October 19.

It is of interest to observe that of the total weight of crop at harvesting, if the beets are properly 'topped' on the field, practically one-half is removed in the dressed roots.

In the following tabular scheme the data representing the fertilizing constituents in the crop are given, the figures indicating the amounts (per acre) found in the various parts at the three periods of collection :—

FERTILIZING Constituents in Beet Crop. Pounds per Acre (Computed).

Dates of Collections.	Leaves.				Collars or Crowns.				Roots.			
	Phosphoric Acid.	Potash.	Lime.	Nitrogen.	Phosphoric Acid.	Potash.	Lime.	Nitrogen.	Phosphoric Acid.	Potash.	Lime.	Nitrogen.
1st collection, July 29	4·8	52·8	12·1	21·7	·9	3·3	·3	1·7	3·0	14·0	2·4	5·1
2nd " Sept. 8	12·8	141·0	36·2	49·0	6·0	19·0	2·3	12·0	20·0	63·6	5·6	24·0
3rd " Oct. 19	16·3	122·4	31·4	41·5	5·9	13·5	2·8	12·1	21·2	67·6	9·2	37·4

There is in these results much of interest, but it may suffice for our present purpose to call attention to one or two of the more important deductions that may be made from them. The largest draught is upon the potash. On July 29, the amount was 70 lbs. per acre, increasing to a total of over 200 lbs. by the time the beets were ready to harvest.

The relative amounts of this potash in roots and leaves is also a matter of importance. Thus, according to these results, there is at the time of harvesting the beet practically twice as much potash in the leaves and crowns taken together as in the dressed roots.

Further, we conclude that at this period the phosphoric acid in the dressed roots is essentially equal to that in the leaves and crowns taken together, while the nitrogen in the dressed roots is two-thirds of that contained in the rest of the beet. These deductions will perhaps be more evident from the following table of data, given for October 19, 1904 :

FERTILIZING Constituents in Beet Crop, per Acre.

Constituents.	Leaves and Crowns.	Dressed Roots.	Total.
	Lbs.	Lbs.	Lbs.
Potash	135·9	67·6	203·5
Phosphoric acid	22·2	21·2	43·4
Nitrogen	53·6	37·4	91·0

It is very evident that if the leaves are carted away and used as cattle food the restitution of potash and nitrogen to maintain the fertility of the soil must be very much greater than if the crop is 'topped' on the field.

Another important deduction may be made respecting the period of growth at which this plant food is more particularly absorbed by the beet crop. The figures from which to obtain this information are as follows :

WEIGHTS of Fertilizing Constituents per Acre in Beet Crop (Roots, Crowns and Leaves) at various stages of growth.

Dates of Collections	Phosphoric Acid.	Potash.	Lime.	Nitrogen.
	Lbs.	Lbs.	Lbs.	Lbs.
First collection, July 29	8·7	70·1	14·8	28·5
Second " Sept. 8	38·8	213·6	44·1	85·0
Third " Oct. 19*	43·4	203·5	43·4	91·0

It needs but a glance to show that there is very little appropriation of soil food after September 1, though from that date till the middle of October there was a large production of sugar, as made evident by the increase in the weight of dressed roots (1 ton 633 lbs. per acre) and the higher percentage of sugar in them. The percentages of sugar in the beet at the various periods, were as follows : July 29, 8·07 per cent; September 8, 14·12 per cent ; and on October 19, 14·94 per cent. This early assimilation of nourishment from the soil, to my mind, points to the desirability of thorough

*From the weight of potash recorded for this collection being less than that for Sept. 8th, it seems quite probable that all the data for the third collection are somewhat too low—owing, we conjecture, chiefly to the loss of mature leaves, as already explained.

preparation of the soil, so that by a favourable tilth or mechanical condition of the soil and a generous supply of available plant food the young plant may make a rapid growth during the spring and early summer months. It is not desirable, as is well known, to grow a large beet, as that would mean a poor beet for factory purposes, but the size should be controlled by the system of sowing rather than by lack of plant food or an unfavourable condition of the soil. The elaboration of sugar—the aim of growing the crop—does not take place to any large extent while the beet is yet young, it occurs rather during the maturation of the plant. For a large production of sugar there must be an abundance of foliage, and this cannot be obtained unless the plant has access to large stores of soil food, both mineral and nitrogenous, during that earlier period in the beet's history, when the foliage is more particularly developed.

THE EFFECT OF RUST ON THE STRAW AND GRAIN OF WHEAT.

The prevalence of rust this season in certain districts of Manitoba has led to inquiries regarding the general effect of this fungus upon the wheat plant—both straw and grain—and more particularly as to how it may influence their feeding value. To obtain data on this subject, samples of both rusted and rust-free wheat have been obtained and analysed.

In order that the results should be strictly comparable, it was important in procuring these samples that the clean and the affected wheat should be of the same age and grown on the same soil. Through the kind offices of the editor of the 'Nor-West Farmer,' we were able to secure such specimens. In the letter accompanying them (under date of September 15), it is stated that both wheats were collected by hand on the same day in the same field, on the farm of Sir William Van Horne at East Selkirk, Manitoba.

There was a marked difference in appearance between them, both in straw and grain. The rust-free wheat had a clear, bright yellow, well-ripened straw; a normal ear, both as to size and colour, and plump, well-filled grain. On the other hand, the rusted wheat straw presented in general a dirty greenish-brown appearance and on closer inspection showed many spots or patches of infection, while its ears were smaller than normal and the kernels light and much shrivelled.

ANALYSIS of Rusted and Rust-free Wheat—Straw and Grain.

—	Weight of 100 kernels.	Moisture.	Crude Protein.	Crude Fat.	Carbo-hydrates.	Fibre.	Ash.
	Grams.						
Straw from rust-free wheat		7·92	2·44	1·65	39·00	39·95	9·04
" rusted "		7·92	7·69	1·97	38·44	36·78	7·20
Grain from rust-free wheat	3·0504	12·26	10·50	2·56	70·55	2·29	1·84
" rusted "	1·4944	10·66	13·69	2·35	68·03	3·03	2·24

The Straw.—We first notice that in crude protein the rusted straw is much the richer. Under the term crude protein is included all those nitrogenous compounds of a food that go to repair waste, form blood and build up muscle and tissue. The high

value of concentrated feed stuffs is due chiefly to the large proportion of protein they contain. It may safely be concluded, therefore, that the rusted straw, containing as it does more than three times the protein found in the rust-free straw, is very much superior in feding value.

Further, in the rusted straw we have a slightly higher percentage of fat—the constituent next in value to protein—and somewhat less fibre—the element of least value in a fodder, and hence there is additional evidence of the most satisfactory character to support the statement respecting the more nutritious nature of the rust-affected straw.

The Grain.—The small and shrivelled character of the grain from the rusted wheat may be deduced from the data in the first column of the table—the weight of 100 kernels being only half that of 100 kernels from the unaffected wheat. This fact, however, from the standpoint of a feed does not betoken a lessening of the nutritive qualities; indeed, as the data for the protein show, it has, weight for weight, considerably the higher value.

The protein of the shrivelled grain is 5·19 per cent higher than that of the plump grain from the rust-free plant. Part of this higher protein content in the smaller grain is no doubt to be accounted for in its larger proportion of bran—but chiefly is it due to the fact that the transference and accumulation of starch in the kernel has been but partial and incomplete. *

Other features of note in the analysis of the grain from the rusted wheat are : (1) the somewhat larger percentages of fibre and ash—indicating more bran—and, (2) the lower carbo-hydrates (starch) and fat content.

Apart from the valuable information that these data furnish regarding the relative feeding value of the straw and grain of rusted wheat, we have in these results interesting evidence as to the physiological effect of the rust on the wheat plant. Speaking broadly, there are (after germination) two periods in the life of the wheat plant—the first, a period of feeding and assimilation; the second, a later and usually shorter period, during which the food materials accumulated in the stem and leaf (straw) are transferred to and stored in the seed (kernel). There is, of course, no exact time when it can be said that the one ends and the other begins. Under normal conditions there is a gradual cessation of feeding, both by root and leaf, accompanied by an ever increasing movement of the accumulated material to the seed. The first period is characterized by growth, the second is recognized by the maturation or ripening of the seed.

Further, it would seem that in the development of the seed, the albuminoids or protein are the first to be transferred and later—towards the close of the maturation period—the carbo-hydrates (starch, &c.), are more particularly deposited.

The rust apparently does not affect the vitality of the wheat plant during the first stage or period, but as the season progresses and the ripening period advances the fungus attains the ascendancy, crippling the energies and functions of the tissues and checking the movement of the food materials to the seed. In other words, the growth of the rust arrests development and induces premature ripening, which, as we have seen, means a straw in which still remains the elaborated food, and a grain small, shrivelled, immature, rich in protein and deficient in starch.

It may be well to point out that although the rust makes the grain more nitrogenous, it at the same time very materially reduces the yield per acre—the present figures indicating a loss in weight of about 50 per cent.

We have not as yet been able to complete the analysis of the milling products of this shrivelled wheat, but we may rest assured until such time as the data are avail-

* NOTE.—Some years ago in determining the relative feeding value of frosted wheat (which presents a shrivelled appearance very similar to that of the grain from rusted wheat) we found that the protein content was considerably higher than in the unfrozen mature grain. It is evident that the effect of rust and frost in this respect, is the same, resulting in a premature ripening or rather a drying out of the grain which, as we have seen, means a kernel high in protein, but low in starch.

able that its proportion of bran to flour will be higher than from normally ripened wheat. We may, further, conjecture that this bran will be found slightly more nitrogenous than that from rust-free wheat. It is held by certain millers that rust makes the flour somewhat 'stronger,' but at the moment there are no data, I believe, to support this contention.

WELL WATERS FROM FARM HOMESTEADS.

One hundred samples of well water have been received during the past year. Of these, 66 were submitted to analysis, the remaining 34, by reason of insufficient quantity or a dirty bottle or cork, were not examined. In the appended table the data obtained are given, together with a very brief conclusion as to the character of the water. To those forwarding the samples more extensive reports have been sent, indicating the character of the pollution when present, and when necessary and possible making suggestions for the improvement of the supply.

It will be seen by reference to the table that of the 66 waters examined, 27 were returned as safe and wholesome, 18 were found most seriously polluted, and 16 were reported as very suspicious and probably unsafe. Five were saline waters.

There are too many shallow wells in existence and most of them, I regret to say, are situated so that they may receive soakage from the barnyard or similar contaminating source. The barnyard and back-door wells should all be filled up, for they are a menace to the farmer and his family and, further, it should be emphasized that water which is dangerous to use in the house cannot be good for stock.

The soil is an excellent purifying agent, but it has its limitations and once it has become loaded and choked with organic filth it cannot longer perform this beneficial function. When once the soil surrounding a well has become so charged no amount of cleaning the well will prove effective; the well should be abandoned.

Our 'deep seated' waters are for the most part pure and the driven well, placed at safe distance from the farm buildings and equipped with a windmill pump, should be a source on many farms of an ample and wholesome supply for house and barn. There are other sources of good water, creeks, rivers, and lakes, and these can frequently be utilized at little cost. An earnest and intelligent effort will result in most instances in securing pure water, and no farmer should rest content without making this effort if his present supply is from the barnyard well. Pure water is as necessary and desirable in the country as in the city, and there is no reason, with a moderate outlay, why it should not be found in the rural home. We believe there has been a great improvement in this matter during recent years, but the facts clearly show that there is yet room for advance.

All that has been said regarding the supply for the farm applies with equal force to that of the creamery and cheese factory. It was admitted at the Dairy Conference recently held in Ottawa that the water supplies of many of these factories were anything but satisfactory. Instances, and many of them, were given of very foul water being used in the making of both butter and cheese—and the consensus of opinion amongst those present was that there should be a systematic inspection and examination of all the supplies of creameries and cheese factories and, if necessary, to have legislation on the matter. Dairy experts are agreed that neither first-class butter or cheese can be made if the water is not good. It will thus be seen that the water question is one that affects our commerce as well as our health.

ANALYSES OF WELL WATERS, 1904.

RESULTS STATED IN PARTS PER MILLION.

Number.	Locality.	Marks.	Date.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates and Nitrites.	Chlorine.	Total Solids at 105° C.	Solids after Ignition.	Loss on Ignition.	Phosphates.	Report.
			1903.									
1	Dunham, Que.	E. O'L.	Dec. 7	·058	·105	·100	Nil.	65·6	48·0	17.6	Slight trace.	Eminently suited for drinking and household purposes.
2	Calgary, Alta	J. A. T.	" 14	Frec.	·162	·44	2·5	667·0	419·0	248·0	None	Good and wholesome.
			1904.									
3	Vankleek Hill, Ont.	J. A. Mac	Jan. 18	·05	·095	5·171	34·5	422·4	266·8	155·6	Traces.	Very suspicious.
4	Knowlton, Que	S. A. F.	Feb. 6	·445	·425	8·375	5·8	185·6	89·6	96 0	Heavy trace.	Contaminated with drainage matter
5	Welwyn Station, Assa	A. S.	" 8	·138	·98	11·559	173·0	8632·8	6140·0	2492·6		Saline water.
6	Fredericton, N.B	F. A. G. No. 1.	Mar. 14	·015	·1875	·267	3·0	72·0	32·0	40·0	Free.	Probably unpolluted.
7	"	" No. 2.	" 14	·09	·045	·111	1·0	8·0	3·0	5·0	"	"
8	Bayswater, Ont.	L. N.	" 19	·036	·135	4·615	21·0	407·6	182·4	225·2	Traces.	Polluted.
9	Oaklake, Man	H. R. T.	" 28	·01	·315	4·29	72·5	4071·0	3138·0	933·0	None	Saline water.
10	McAdam, N.B.	J. W. H.	" 28	·06	·05	3·261	9·0	102·4	62·6	39·0	"	Suspicious.
11	"	D. T.	" 28	Free.	·075	3·623	6·75	71·6	33·6	38·0	"	Somewhat suspicious.
12	Nepean, Ont.	J. K.	" 29	"	·45	5·419	27·5	446·0	247·2	198·8		Very seriously polluted.
13	Dunham, Que.	A. W. W.	Apr. 14	·335	·135	1·815	2·0	182·4	108·4	74·0		Suspicious.
14	Mahone Bay, N.S.	A. C. No. 3.	May 18	·045	·18	·058	4·0	27·6	2·8	24·8	V. S. trace.	Good and wholesome.
15	"	" No. 4.	" 18	·098	·125	·017	4·0	32·4	4·4	28·0	Slight trace.	"
16	"	" No. 5.	" 18	·02	·195	·082	6·25	34·8	6·4	28·4	None	"
17	Clinton, Ont.	D. A. F.	" 25	Free.	·18	11·62	18·3	438·2	254·4	183·8	Traces.	Contaminated.
18	L'Epiphanie, Que.	J. P. C.	June 7	·050	165	·041	32·5	166·0	126·4	39·6	"	Good and wholesome.
19	Campbell's Bay, Que	T. A McT.	" 14	·10	·90	·29	1·0	253·0	149·0	104·0	"	Very suspicious.
20	Nepean, Ont.	W. L. R.	July 6	13·07	5·03	4·38	110·0	944·8	560·0	384·8	V. H. trace.	Contaminated; unfit for domestic purposes.
21	Hintonburg, Ont.	H. R.	" 12	·024	·115	3·892	14·5	344·0	216·8	127·2	Hvy. ppte.	Seriously polluted.
22	Wallace, N.S.	C. W. M.	" 20	·036	.4575	·0037	170·0	191·0	112 0	79·0	V. S. trace.	Suspicious.
23	Fredericton, N.B.	E. B. J. No. 1.	Aug. 1	·06	·188	·092	2·3	70·0	33·6	36·4	Traces.	Free from pollution.
24	"	" No. 2.	" 1	·188	·165	·0297	2·8	75·6	35·6	40·0	Trace.	Seriously contaminated.
25	"	" No. 3.	" 1	·03	·14	·0249	2·2	69·2	33·2	36·0	"	Free from pollution.
26	"	" No. 4.	" 1	Free.	·138	·05	1 6	64·4	32·4	32·0	None	"
27	South Durham, Que.	R. M.	" 3	1·14	·135	3·55	22·5	207·6	152·8	54·8	Heavy trace.	Very seriously polluted.
28	Muskoka, Ont.	W. G. O'H.	" 4	·24	·27	4·923	60·0	344·4	207·5	136·8	Traces.	Contaminated with drainage matter
29	Summerside, P.E.I.	J. R.	" 9	·056	·038	3·0	17·0	178·8	103·6	75·2	V. H. trace.	Dangerously contaminated.
30	"	A. C.	" 9	Free.	Free.	·288	9·0	126·4	86·4	40·0	Slight trace.	Wholesome.

31	Elgin, Ont.	G. S. C.	"	9	"	·335	2·095	90·0	575·6	431·6	144·0	Heavy trace	Unfit for drinking purposes.
32	Wallace, N.S.	C. W. M.	"	9	·02	·50	Free.	21·0	146·0	85·2	60·8	Traces.	Suspicious.
33	Sky, Ont.	H. A. McD.	"	9	3·87	·39	9 022	28·0	475·6	403·6	72·0	"	Very seriously polluted.
34	Hampton, N.B	J. D. F.	"	10	Free.	·315	Free.	110·0	602·0	406·0	196·0	Free	Suspicious.
35	Rockliffe, Ont	M. A. S.	"	16	"	·073	·428	2 0	160·4	103·6	56·8	V. S. trace.	Wholesome.
36	Lancaster, Ont.	W. J. S.	"	17	·548	·28	Traces.	21·0	343·6	270·8	72·8	Slight trace.	Most seriously polluted.
37	Shawville, Que.	R. H.	"	25	·01	·52	·008	2·25	16·4	3·6	14·8	"	Good and wholesome.
38	Ashcroft, B.C.	R. S.	"	25	·01	·078	·304	13·0	1102·4	809·2	293·2	Traces.	Slightly saline, but most probably wholesome.
39	Somenos, B.C.	J. J.	"	30	None.	·03	·214	1·75	45·6	29·6	16·0	Slight trace.	Very good water.
40	Channel, Que.	J. W. P.	Sept.	1	"	0·85	3·195	4·25	247·2	192·0	55·2	"	Free from pollution.
41	Arnprior, Ont.	G. A. C.	"	6	·21	1·74	6·695	400·	13·20	1032·8	287·2	V. S. trace.	Very seriously polluted.
42	Fredericton, N.B.	E. B. J. No. 5.	"	6	·036	·208	·0197	1·8	74·8	31·6	43·2	"	Good and wholesome.
43	"	" No. 6.	"	6	·010	·24	·024	2·0	75·2	32·0	43·2	None	"
44	"	" No. 7.	"	6	·044	·256	·0131	2 5	64·8	34·8	34·0	V. S. trace.	"
45	"	" No. 8.	"	6	·050	·208	·0082	2·2	75·2	31·2	44·0	"	"
46	Carp, Ont.	J. H. C.	"	10	·06	·155	4·48	28·0	417·6	305·2	112·4	Heavy trace	Seriously polluted.
47	Grenfell, N.W.T.	E. F.	"	12	·045	·24	None.	23·0	2035·0	1550·0	485·0	"	Saline water.
48	Baldur, Man.	H. McPh.	"	15	Free.	·915	"	14·0	744·5	504·0	240·5	"	Suspicious.
49	Wolseley, Assa.	C. J.	"	20	None.	·15	·115	16·5	1671·2	1392·0	278·2	"	Saline water.
50	Monckland Station, Ont.	N. J. R.	"	21	·375	·165	None.	None.	304·0	216·0	88·0	Trace.	Decidedly suspicious.
51	Westboro', Ont.	A. C. M. S.	"	22	·13	·123	"	1·25	152·8	127·2	25·6	V. S. trace.	Suspicious.
52	Sussex, N.B.	W. B. McK.	"	30	Free.	·135	·026	5·0	108·0	48·0	60·0	Trace.	Pure and wholesome.
53	"	B. S.	"	30	"	·036	3·805	18·0	142·0	78·0	64·0	Heavy trace	Decidedly suspicious.
54	Arrowhead, B.C.	D. T. H.	Oct.	12	·02	·07	None.	Trace.	258·8	230·8	28·0	Trace.	Excellent water.
55	Mayton, Alta.	A. A.	"	12	1·17	·77	"	.....	935·2	624·0	311·2	None	Seriously contaminated.
56	Westboro', Ont.	A. C. M. S.	"	22	Free.	·14	2·47	9·8	179·2	117·6	61·6	V. S. trace.	"
57	Yellow Grass, Assa.	G. T. D.	"	27	None.	39·02	11·94	2200·0	38928·0	37015·2	1912·8	None	Strongly saline.
58	Gaspé, Que.	M. S. K.	"	27	·31	·625	8·54	11·5	335·2	234·0	101·2	Trace.	Most seriously polluted.
59	St. Samuel, Beauce, Que.	L. P. D.	Nov.	8	·02	·38	·016	Trace.	98·0	43·2	54·8	Slight trace.	Pure and wholesome.
60	Kingsmere, Que.	J. G. G.	"	9	None.	·038	2·026	·75	115·2	76·0	39·2	"	"
61	North Gower, Ont.	A. T. J.	"	11	·21	·531	·98	.....	259·0	159·0	100·0	None	Very suspicious.
62	Calgary, N.W.T.	A. O. M.	"	18	·01	·108	·47	2·75	438·6	303·6	135·0	V. S. trace.	Free from pollution.
63	Westboro', Ont.	A. C. M. S.	"	18	Free.	·08	1·35	3·8	164·0	114·8	49·2	Slight trace.	Safe and wholesome.
64	Rideauville, Ont.	Mrs. J. H. A.	"	19	·05	·12	·38	49·5	870·8	632·8	238·0	Trace.	Very suspicious.
65	Okanagan Landing, B.C.	F. H. C.	"	24	·07	·21	·37	7·0	811·6	435·6	376·0	None	Very suspicious, most probably dangerous.
66	South March, Ont.	I. W.	"	25	·038	·113	1·599	26·5	442·8	282·4	160 4	"	Showing evidence of previous contamination and probably unwholesome.

THE SEPTIC TANK FOR THE DISPOSAL OF SEWAGE.

Certainly one of the most hopeful signs of progress, one might almost say of advancement in civilization, at the present time is the widespread desire in the country home for a better and more convenient water supply, for a bath-room, and for those sanitary conveniences (closet, sink, laundry, &c.), which go so far towards making the difference in comfort between the city and the farm house, especially in the winter. The requests for information regarding these matters, and particularly respecting some simple and effective method for the disposal of the sewage from the farm house, have been very numerous during the past year.

As regards the latter question, these inquiries have been answered by an account of the septic tank system, a comparatively speaking new system, but one that has proved highly satisfactory, as far as the writer is aware, wherever it has been tried. In many instances this correspondence has further led to requests for details, dimensions and drawings. It has, therefore, been thought advisable to insert the following detailed account of this system with illustration in the Annual Report, since its publication in this way will not only bring the matter prominently before a very large number of farmers, but will place on record in an available form particulars which it is almost impossible to furnish in the limited scope afforded by an ordinary letter.

We have no hesitation in saying, at the outset, that there is no method of sewage disposal at once so effective, so cheap, and so simple for the farm house, the creamery and the cheese factory, as that which is known as the Septic Tank System. For its working, a water supply in the house or building is necessary, but there is no good reason now-a-days why such should not be obtainable on the majority of farms. There are many means of bringing water from a safe, and perhaps fairly distant source, into the house and barns, and one or other of these, as circumstances dictate, should be employed. Apart from the question of sewage disposal, apart from the convenience and the saving of labour that would follow, such a water supply must now be considered from the health standpoint most desirable, if not a necessity. Reference to results given annually in these reports show that the shallow well, sunk in the barnyard or about the farm buildings ought to be abandoned. Such wells are always a menace to the health of the farmer and his family, and his stock. With a water supply in the house—even though that may consist merely of a tank in one of the upper rooms periodically filled by a force pump, and from which pipes lead to the bath room and kitchen—there is nothing to prevent the installation of this system, which, as one writer of authority puts it, is at once 'inexpensive, absolutely automatic, scientific, simple, and in every way thoroughly efficient and satisfactory.'

Very briefly, the system may be outlined as follows:—The sewage or waste from the closet and sink is conducted by the soil pipe, 4 inches in diameter, into a tank, situated outside the building, in which, without the addition of any chemical or disinfectant, but simply by the action of certain self-sown microbes or bacteria (which accomplish their useful work of destruction largely in the absence of light and air), its organic matter—its filth—is decomposed and rendered harmless, and moreover its disease germs, if any are present, destroyed. The effluent or what might be termed purified sewage is now discharged automatically and intermittently from the tank, either into a filter box containing gravel or sand, or coke, or, better still, into a system of subsurface or distributing field tiles of unglazed ware which allow the effluent to soak into the soil throughout their whole length. The distance from the house to the tank is not a matter of any moment. The tank must be water-tight, and may be constructed of brick or stone cemented or, preferably, of concrete. When this system was first put into use it was supposed that light and air prevented the development of the filth destroying bacteria and, therefore, that it was essential for the tank to be practically light tight and air tight. Further, it was held that the inlet and outlet should be so arranged that the sewage would not be disturbed by currents. According to certain authorities it is still believed that the bacteria can only do their best work under these conditions. More recent investigations, however, go to show that such

precautions are unnecessary. The bacteria which are engaged in this destruction, or rather nitrification, of the organic matter of the sewage do not all belong to that class which can only thrive in the absence of the oxygen of the air. However, these considerations need not be here further discussed. It is sufficient for our present purpose to know that the system, as consisting of the closed tank and distributing tiles, is efficient alike in the satisfactory disposal of house sewage and waste from the house factory or creamery.

For practical purposes—that is, for the installation of the system—the following details and the accompanying illustrations will no doubt prove serviceable.

SEPTIC TANK AND DISTRIBUTING TILES

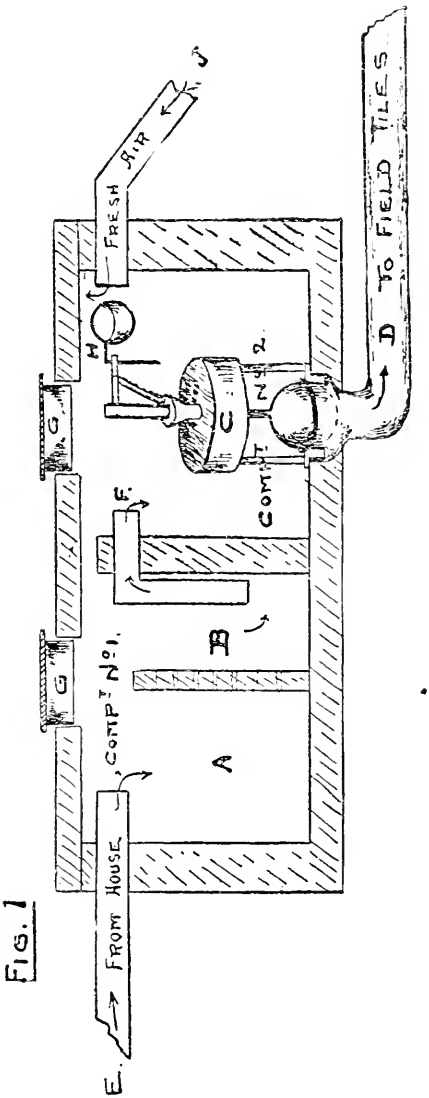


FIG. 1

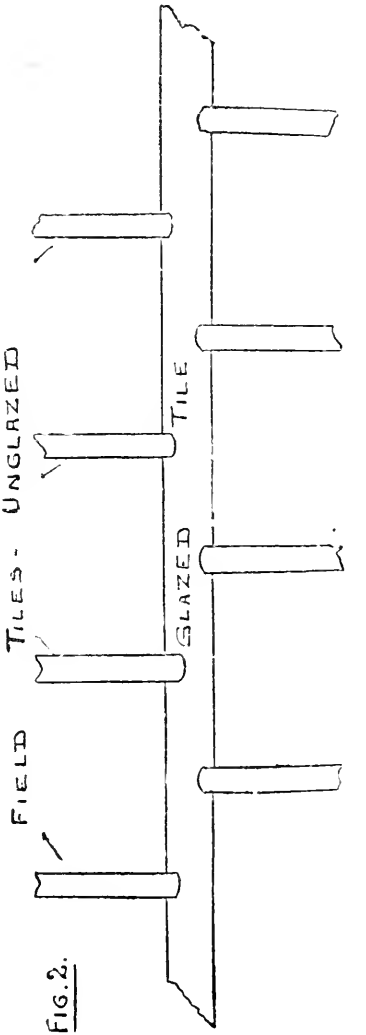


FIG. 2.

Figure I. represents a tank fitted with the automatic discharge valve. The size of the tank for the ordinary farm house may be 6 feet long by 3 feet wide by 3 feet deep, or a working capacity, say, of 120 gallons to each compartment. Since it is apparently desirable that the sewage should be submitted to the action of the bacteria for a period of 24 to 36 hours before passing into the second compartment of the tank, it is perhaps better to have the tank a little too large than too small. It is customary to allow a capacity of 12 gallons for each person. It will be seen that by a partition wall, carried within two inches of the top or roof, the tank is divided into two smaller tanks or compartments, figured as No. 1 and 2. Into the first of these, near the top, the sewage from the house flows through the glazed tile E. connected with the soil pipe which opens above the roof. The pipes from closet, bath, sink, &c., should, of course, be trapped before entering the soil pipe.

In this tank or compartment (No. 1) there should be a perforated partition, as shown in cut, to prevent paper and other solids entering the overflow and being carried over into compartment No. 2. It is in No. 1 compartment that the bacteria chiefly effect their work of decomposing the organic matter of the sewage, and when in time this compartment becomes full its fluid contents pass over into No. 2 by means of the overflow F. If there is no perforated partition in No. 1 the lower orifice of this overflow (F) is covered with wire netting which may act as a strainer to prevent any paper, &c., passing into No. 2. In compartment No. 2 is the automatic valve H., connected with the discharge pipe D, which carries off the effluent to the subsurface tiles (see figure 2). The success of the system depends largely upon this valve, for it is essential that compartment No. 2 should be emptied as soon as it is full, and then allowed to refill. This can only be satisfactorily accomplished by a self-acting (both opening and closing) valve.* This second chamber should have a 4-inch vent pipe, to allow the entrance of air. Manholes are provided at G, to permit of the examination of the tank at any time. The probabilities are, however, that no cleaning out will be necessary for years, as the action of the bacteria is very thorough and complete in destroying the organic matter.

The tank must be so situated that its glazed discharge pipe D. *at the point from which the field tiles are led off is not more than 12 inches below the surface of the ground.* This pipe as well as the field tiles are to be laid on a level so that the latter will be equally filled when the tank is discharged. If the ground be level, this will necessitate constructing the tank so that a portion of it is above the surface of the land, and in this case it should be banked around, covered with earth and sodded. It is not essential that the tank should be close to the house, but if placed at a distance the inlet pipe should have a fall from the house and be protected from the frost. Unglazed field tiles inserted every two or three feet along the discharge pipe D. finally distribute the effluent through the soil (Fig. 2). If desired, these distributing tiles from D need not commence in the immediate vicinity of the tank, but it is important that they should not be at a greater depth than 12 inches, unless the soil is very light and sandy and has good natural drainage. Since a 4-inch tile holds ½ gallon and it is essential that there should be tile capacity for all the effluent immediately on discharge, a tank with a compartment No. 2 of 100 gallons will require at least 200 distributing tiles. If the soil is heavy clay, it should be underdrained. When the soil is of such a character that percolation is very difficult, the distributing tiles may be replaced by a 'filter box' of sufficient size, filled with sand or gravel, or coke, the effluent entering near the top at one end and being conducted away from the other end by subdrains. However, in practice it is found that a larger tank with less frequent discharge and more tiles is preferable to a filter box.

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*An automatic discharge valve is made by the Dominion Valve Co., Toronto. The price is from $18 to $25, according to size and quality.

This system is in operation in many parts of Canada and has proved satisfactory wherever installed, so that it cannot be regarded as an experiment. It is in use in rural homes, in several cheese factories and creameries, in asylums, factories, &c., and in every instance, I believe, it is working efficiently.

In the preparation of this article, the writer has consulted Dr. P. H. Bryce, Chief Medical Officer of the Department of the Interior, who, when Secretary of the Provincial Board of Health for Ontario, was instrumental in introducing this system into various public institutions. He authorizes the statement that after 15 years' experience this system properly installed has proved the most sanitary and most economical method yet discovered for sewage disposal on a moderate scale.

AN AGRICULTURAL TOUR IN BRITISH COLUMBIA.

Accompanied by Mr. J. R. Anderson, Deputy Minister of Agriculture, Victoria, I visited during May and June of the present year the greater number of the more important agricultural districts of that province, both on Vancouver Island and the main-land. This tour had been under contemplation for some time past, for the number of inquiries regarding soils, crops, &c., &c., received from that province has been steadily on the increase for several years, and it was felt that the information, the advice thus sought could be more satisfactorily given if the writer had some personal knowledge of the country, its soils, and methods of farming. Further, it was desirable to study more fully the climatic conditions prevailing in the various districts referred to, as well as to obtain an insight into the practice of irrigation, largely used in the Okanagan, Nicola and valleys and other parts of the 'dry belt' of British Columbia. The itinerary was planned and arranged by Mr. Anderson, to whom I am greatly indebted for much help and many kindnesses. It was at a time when one could best study the soils and their crops and afford an opportunity of meeting the men working the land on the land and discussing with them their failures and successes. The days, therefore, were spent largely in examining soils, crops, and conditions generally. We were frequently accompanied through the fields by the farmer and his neighbours and this enabled us to hold many impromptu meetings 'on the ground,' which proved of much interest and value to all present. In the evenings, meetings of a more general character were convened under the auspices of the local Farmers' Institute. In all, twenty-one of these evening meetings were held and addressed, and with very few exceptions the attendances were large. The interest of the people in agricultural matters was evident at every point visited and there was a sincere desire on the part of all whom we met in this way to benefit as far as possible by our visit. Considered from every point of view, I look back upon this tour as possibly the most satisfactory I have ever made to any province in the Dominion. The information gained must be of immense value to me in the future when considering the farming problems of that province, and in this connection, I desire to add that very much of the interest and enjoyment of the trip was due to the intimate knowledge of the country by Mr. Anderson, who was not only of the greatest service to me, but who strove to make my visit both pleasurable and profitable, and in this was eminently successful.

It will not be possible to give any detailed account of this survey trip here, but an outline enumerating the places visited, together with one or two of the more salient features of the districts examined, may prove of interest.*

Vancouver Island—Nanaimo and Cedar.—Though there are clay lands in this district their area appears to be limited. The larger part of the soil is of a light sandy or gravelly nature, which is frequently deficient in humus. The value of clover—

*A report of this tour, in extenso, has been written by Mr. Anderson, and will appear in his forthcoming report of the Department of Agriculture for British Columbia.

which undoubtedly will grow well here—for replenishing the soil in this valuable constituent was pointed out. The clay soils require similar treatment and would also be improved by an occasional liming. The use of swamp muck as a fertilizer was explained and the most economic treatment for bringing these muck soils (which occupy considerable areas in Vancouver Island) into successful cultivation, given. Orchards here were found, as a rule, in sod. This is evidently a plan not best suited for the soil and climatic conditions prevailing. Dairying is progressing and a creamery, started about a year ago, is stated as making good progress and leading to the increase in the number of milch cows, and consequently to more manure produced on the farm. There seems no reason why pork production should not increase with the development of the dairy industry and thus give the farmer an additional and lucrative source of revenue..

Comox and Courtenay.—This has already established an excellent reputation as a dairying district, there being good pasture, excellent water and some very fine dairy animals on practically all the farms visited. The co-operative creamery at Comox is well patronized and is stated to be in a flourishing condition. Greater care is required to keep the fields free of weeds, among which we noticed the Canada thistle and Velvet Grass. This latter is almost worthless as a pasture grass or for hay, and efforts should be made by ploughing up old pasture and re-seeding neglected fields to stamp it out. A very noxious weed that is spreading here and elsewhere on the island is the Wild Barley *(Hordeum jubatum)*. Its awns are dagerous, causing sores in the jaws of the cattle eating the grass. Since dairying will undoubtedly be the most important branch of farming here, the value of corn and the silo was pointed out. In both Nanaimo and Comox districts the introduction of silos would no doubt be advantageous.

From Courtenay we proceeded to Cumberland, and from that point drove to Parkville—most of the way being through a magnificent forest, chiefly of Douglas fir, cedar and balsam. There are but few ranches as yet along the road. The soil on the higher ridges is light and gravelly, but much of the nature of a black sandy loam is noticed in the lower levels. At Parkville there was an excellent meeting, at which many matters of interest in connection with the treatment of soils, &c., were discussed.

Alberni.—The drive from Parkville to Alberni (27 miles) traverses a most magnificent primeval forest, one certainly that no effort should be spared to protect from the ruthless axe of the lumberman. This region would, if reserved, make a national park of unexcelled beauty and grandeur, for its scenery, especially in the vicinity of Cameron lake, is very fine. Managed under the rules of good forestry, moreover, it could be made remunerative, which we scarcely think will be the case once the trees are gone, for the soil is very light and for the most part ill adapted to agriculture.

At Alberni a beginning is being made in co-operative dairying, a creamery being in course of construction a few miles from the village. This will materially help to improve the farming prospects, by converting the raw material into a finished and more concentrated product. There will then be a possibility of getting the produce to Victoria and other markets, at present impossible owing to well nigh prohibitive freight rates. The reclamation of muck lands was a subject here of much interest as there are large areas now in swamp that might be made productive.

On the Mainland—Agassiz and Chilliwack.—These were the first places visited. Two days were spent with much profit on the Experimental Farm at Agassiz, and under the experienced guidance of Mr. Sharpe, the Superintendent, much information was gained as to the possibilities of the district, not only as a fruit-growing area, but also as to its suitability for mixed farming. It was somewhat a matter of surprise to me to find such excellent soil on the upper benches of the mountain here, soil of better quality in fact than much of that occupying the flats level with the river, the greater part of which at this point is of a very sandy or gravelly nature. The luxuriance of the clover crop here showed that there should be little difficulty in economically maintaining the soil's fertility.

Chilliwack is essentially a dairying district, and here two days were spent in inspecting many of the good farms in the neighbourhood. There are two creameries in operation and each, I was told, had its full quota of patrons. Oats are extensively grown, but the chief crops are roots and clover, though the area in Indian corn is yearly increasing. This is essentially one of the most thriving and prosperous of the districts visited. The crop yields are reported as excellent. Velvet Grass, already referred to is, however, taking possession of some of the fields owing to poor methods of farming. In certain portions of this district the soils were found to be sour and in a measure unproductive, owing to insufficient drainage. I, therefore, spent considerable time in discussing with the farmers such means as might be practicable for lowering the water level, which I feel sure is essential to making such soils profitable. There are certain areas here covered with muck soils, and we, therefore, devoted some time to their careful inspection and the outlining of such treatment as we considered desirable for their improvement.

Ladner and the Delta Districts.—Between two and three days were spent in visiting the farms of the Delta, which for the most part are devoted to dairying and are in a thrifty and prosperous condition. Clover, grasses, roots and oats, all give large yields on this excellent soil, which, at many places on the lower Fraser, has been formed by the deposition of rich silt brought down by the river.

Though good pastures were seen that had not been re-seeded for 10, 15 and, in one case we saw, 30 years, my opinion is that still better results could be obtained if they were broken up from time to time and resown. One reason for this opinion is that the Velvet Grass and Buttercup *(Ranunculus acris)* have in many fields taken such possession as to crowd out to a very large extent the clover and good grasses.

A general neglect of the orchards is noticeable in this district ,the trees showing want of pruning and care, the soil being uncultivated and the Tent Caterpillar very common. This pest had in many places stripped the trees of their foliage.

A large number of fine milch cattle in excellent condition were seen here, as at Chilliwack.

Most of the land is of a heavy, plastic nature and would, we believe, be improved by more thorough drainage and an occasional liming.

The district is on the whole in a thriving condition, the only serious drawback being the scarcity of really good water. Nearly all that is used is taken from the ditches between the dykes. The difficulty in this water problem lies in the fact that much of the land is below the level of the river. A system of supply that would convey water from the higher lands and distribute it over the Delta would prove a great blessing.

THE DRY BELT.

Spence's Bridge and Nicola.—Up to this time I had never visited the Dry Belt, and beyond what I had read and had been told, my impression had been formed from what could be observed from the carriage window in passing through on the line of the Canadian Pacific Railway. These impressions, from the agricultural point of view, I am willing to confess, had not been very favourable. The general aspect is forbidding, the apparently barren soil bearing a scanty growth of sage brush and it is indeed difficult to realize that the country is one adapted to agriculture. A closer acquaintance, however, with those parts cultivated under irrigation was destined to dispel this impression and to make one astounded at the truly marvellous results obtained on this sterile looking soil merely by the aid of water. Crossing on the ferry at Spence's Bridge, I had the opportunity of personally examining for the first time the results of irrigation, and these results were certainly a revelation. The farms of Mr. Clements and Mr. Smith are veritable oases. The crop of clover and timothy

which was being cut, was very fine; growth generally was of the most luxuriant character and the fruit trees vigorous, healthy, and bearing well. A casual inspection of the soil, apart from what it can produce with the aid of water, certainly would not lead one to suppose it to be a fruitful one; indeed, it would on such an examination be generally judged as of poor quality. We purpose, therefore, during the coming year to subject typical samples of these soils to careful analysis and hope therefrom to arrive at some better knowledge than we have to-day regarding the cause of their great productiveness. Very possibly it may be shown that the climatic conditions prevailing have been conducive to an accumulation of 'available' plant food—we think this more than probable—and if this proves true it will point to the desirability of carefully husbanding this most valuable heritage and not allowing its waste by the excessive use of irrigation water.

From Spence's Bridge to Lower Nicola the road winds along on the side of the Nicola canyon. Several farms on the route are to be observed, chiefly at the bends of the river, most of them apparently being occupied by Indians, near the cultivated spots. The irrigation ditches are to be seen winding their way down, or rather around, steep inclines of barren-looking soil, carrying a stream of living water brought from some creek at a higher level; then as they reach the bottom lands branching and losing themselves and their precious burden in innumerable smaller channels amongst the most luxuriant herbage of field and orchard. Agriculturally speaking, one cannot help realizing, with water, everything; without water, nothing.

At the Lower Nicola we stayed two days in order to allow me to more thoroughly study the irrigation schemes in vogue, to examine the crops and to visit certain outcrops of 'alkali' that I had been asked to report on. It would be undesirable here to enter fully into the several problems in connection with irrigation that must be solved if this country is to be more than sparsely settled, but we may briefly refer to one or two of the more important features, as they occurred to the writer. We have first to recognize that in many parts the water available for irrigation purposes is limited —many ditches several miles in length were seen, proving that even now water has frequently to be brought long distances. To obtain an equitable distribution of the water is of the utmost importance to the future welfare and progress of this country, for land and farms without water are practically unproductive and valueless. If the tapping of the streams and other sources is left so largely to the greed or caprice of the individual, if the conservation or storage of available waters is neglected, it seems scarcely likely that the community can continue to benefit equitably from the supply. At present much water is wasted that might on other lands prove of the greatest service.

Secondly, we should like to point out how the more frequent use of the cultivator and harrow to preserve a dry earth mulch, might be profitably substituted for water. Such a method of conserving soil moisture is most effective and quite applicable in orchards and for root crops.

Lastly, it is quite evident that in some places too much water is used. The excessive application is detrimental both to soils and crops—the soils are injured physically and chemically, by being choked, becoming sour and losing their more soluble plant food, and the crops suffer through the drowning of their roots. In several instances, we noticed much harm as resulting from this excessive use, especially on the lower levels.

Patches of land were examined that were evidently suffering from the presence of alkali, of which both the 'white' and the 'black' forms are found here. The nature and origin of alkali were explained and the best methods for the treatment of such lands outlined. We took pains at all our meetings and demonstrations in the dry belt to give information on this matter, as well as to speak on the equally important matter, the use and abuse of water in irrigation.

At Lower Nicola and at Coutlée truly magnificent crops of Red Clover, Alfalfa, Sainfoin, and Alsike Clover were seen—it was very evident that all the legumes thrive

here. On the roots of all those examined, nodules were found. Potatoes and root crops also do very well. The chief agricultural industry is at present the production of beef though we think, with railroad facilities to a market, the district would prove almost equally suited to dairying and orcharding. The universal custom is to allow the cattle to find their own food in the woods on the mountains during the summer and to feed them in the winter months on the hay cut from the irrigated fields already spoken of. As the land is taken up, this primitive method of farming must be more and more abandoned, and we are of the opinion that even in beef production the more modern methods which the changed conditions will render necessary to adopt, will be more remunerative than those now in vogue.

A day was spent in the vicinity of Nicola, where there was further and abundant evidence of the wonderful growth of both grasses and clovers.

On the road between Nicola and Kamloops many excellent farms were visited, though some fields, we regretted to notice, were badly infested with wild mustard. Exceptionally fine crops of Alfalfa and Brome Grass were examined at 'Pattersons,' about half way to Kamloops. Two, and frequently three, cuttings, I was told, were taken from the former in the season, while the latter gives a large yield of hay and a very heavy and palatable aftermath for grazing.

Strange as it may seem, great injury to roads and fields had been caused in several places along the route by freshets in the spring. With uncontrollable fury the waters had burst forth from the ravines bringing huge boulders, stones, trees, &c., with them and ruining thereby sometimes beyond hope of reclamation, considerable areas of fine land.

Unfortunately our programme did not allow time for an excursion to Grand Prairie, where I am told there is an excellent farming section and a large number of interested and intelligent men.

From Kamloops a drive was taken on the north side of the Thompson river, along which a ditch to bring water for irrigating purposes is being constructed. The water will be conveyed about 17 miles from Jameson creek. It is expected when the scheme is finished that several thousand acres can be brought into productive cultivation.

The Okanagan.—Proceeding from Sicamous to Okanagan Landing by rail we thence continued by boat to Summerland, a comparatively speaking new agricultural development near the southern end of the Okanagan Lake. This and Peachland, further north on the same side of the lake, were of particular interest to me, by reason of the methods by which they have been developed and exploited by the parties or companies originally owning these sites. The land after careful survey, has been divided into five and ten acre lots, allowances for roads, &c., being made. These lots are sold subject to certain rules and taxes, among the latter being an annual rate (25 cents per acre at Summerland) for irrigation water supplied by the company. The newer of the two places is Summerland, and here at present the greater activity is evident. Many of the lots have been planted as orchards, and if not at present worked by the owner are managed by the company, which, in addition to an initial charge for breaking and planting, collect an annual fee for this care of the trees. The land before this operation has a 'thin' look and is sparsely covered with the native sage, &c., but with working and the careful application of water, it can no doubt be made productive. We should strongly advise, however, better preparation of the soil, than has been the practice, before setting out the trees, and we further believe that the fertility of the soil should be kept up by the occasional growth of clover or some other legume. There is no doubt as to the success of clover here—evidences were clear as to that—and it is the height of folly to imagine, as many do now, that nothing further than water is or ever will be necessary. The climatic conditions we recognize as most favourable, but warmth and water, though all important, do not constitute all the factors necessary for profitable fruit growing. Most of the people who have taken lots speak enthusiastically of the future and certainly the prospects are promising. Summerland is yet in its

infancy and necessarily some years must elapse before there can be much return. Peachland is older and should be in a position to ship fruit in considerable quantities in a year or two. Many who are taking up land in this district have had no experience in fruit growing, but a hopeful sign is the general desire for information by the new-comers. There seems no doubt of the suitability of the climate for fruit, nor with regard to obtaining good markets for the produce in the Kootenays, the North-west Territories, and Manitoba. We may, therefore predict that with careful management of soil and water and the experience that will be gained in the actual culture of the fruit, there is a large measure of success in store for these and similar localities. In addition to apples, pears, cherries, and peaches, corn, melons, tomatoes, and small fruits and vegetables generally are, it is stated, raised successfully.

A very fine cherry orchard in full bearing was seen at Trout Creek, a few miles below Summerland. Large shipments of delicious fruit were being made at the time of our visit.

At Peachland the orchards on most of the lots are thrifty. Many of the peach trees were coming into bearing and gave great promise. Examination of the soil revealed areas of excellent quality, more particularly on some of the higher levels. Careful management of the irrigation water is here necessary as it was noticed that the seepage from water applied on the upper slopes appeared on some of the lots at the base of the hill. In several places this was excessive and doing injury to the trees. These lots required drainage rather than irrigation.

Kelowna.—Several very fine cherry orchards were seen in this vicinity, notably those of Mr. Pridham and Mr. Stirling, and that the district, speaking generally, is eminently adapted for fruit there can be no doubt. Certain large estates in the neighbourhood are being subdivided and sold in small lots for fruit culture and the 'boom' in land was apparently as active here as elsewhere in the Okanagan district.

Through the kindness of Mr. Chaplin, Secretary of the Farmers' Institute here, I was enabled to go over a large amount of the ground within a radius of 25 miles of Kelowna. At one or two places patches of alkali occur and samples were taken for further examination. One very interesting drive was through the main valley to Duck Lake, returning by 'Dry Valley.' This main valley, or rather the greater part of it, has for the past twenty-five years been cropped with wheat without any rational attempt to maintain the soil in a productive condition. The result is most deplorable. Land that I am told was once the most fertile, has been reduced to such a condition that in many instances I could see the crop was not worth harvesting. The heavy clay of which most of this land is composed has been depleted of its humus and available plant food to such an extent by continuous growth of wheat that it is now refractory, hard and altogether unsuitable, chemically and physically, for farming purposes. The only hope for this land which has been so ruthlessly treated lies in the addition of humus and nitrogen through the growth of clover or some other of the legumes. This no doubt will be very difficult to obtain at the outset owing to the condition of the land, and probably at first buckwheat or rye will be found easier to grow for green manuring. These, however, should be followed by a leguminous crop to enrich the soil in nitrogen. We also think that tile drainage and occasional liming will be found valuable in reclaiming the land, both tending to improve its physical condition. Toward's Duck Lake several large hay farms were seen, the crops on the whole being good. 'Dry Valley' suffers for want of sufficient irrigation water. If by an engineering scheme water could be brought at a reasonable cost into this valley, there is a large area of arable land here that would be made profitable.

Vernon.—This is widely and favourably known as a fruit-growing district. There is very little grain sown now, but the area devoted to fruits of all kinds is continually on the increase. The planting out of orchards is considered a profitable investment. The interest and pleasure of our visit to Vernon were much enhanced by our stay at

Coldstream ranch, the estate of Lord Aberdeen, Mr. Ricardo, the manager, having kindly extended to us his hospitality. Mr. Ricardo not only took us over the larger portion of this magnificent and well-kept estate, but drove us over a considerable part of the surrounding country. In this way I was able to learn much of the character of the soil, the methods of irrigation in vogue, and the capabilities of this highly favoured district.

A visit to the Commonage was of much interest. This district lies only a few miles from Vernon, but unfortunately has practically no water supply available for irrigation purposes. For the past few years, I understand, the farmers here have done fairly well (the district has been settled about six years) owing largely to a succession of wet seasons. This year being exceptionally dry, the crops are very short. It is certainly a hazardous undertaking when farming is attempted here without the aid of irrigation. Excellent meetings were held under the auspices of the Farmers' Institute at Vernon and Commonage.

Armstrong.—It is held that here and northward there is a sufficient rainfall for agricultural purposes and therefore irrigation is not practised. However, the present season had been a very dry one and as a result very short grain crops were obtained. Much of the soil is very heavy and had become refractory owing to poor methods of farming. It stood badly in need of humus. Where hay was grown, both the crop and the soil were better. The soil generally is a strong one, but it already stands in need of much better treatment—which may be outlined as comprising, the growth of clover, more attention to rotation of crops, the use of tile drainage, and the application of lime. We, further, are of the opinion that both dairying and fruit growing might be considerably developed with advantage to the district.

From Armstrong the drive to Enderby was taken, spending a day or two on the road at Sir Arthur Stepney's ranch, now in charge of Mr. Heggie. It is only right that I should add, this ranch is being conducted on rational lines, the land constantly improving rather than deteriorating. As already remarked, much of the land in this district of Spallumcheen is unprofitable, due to the continuous growth of wheat.

At Enderby the general conditions of soil, &c., are much the same as at Armstrong. It has been a wheat-growing district and in consequence the land has suffered. Where Alfalfa and clovers are grown, excellent crops are obtained and the land is steadily improving. If the farmers can only get away from this practice of wheat after wheat and grow the legumes more largely, this district will assuredly hold its reputation as amongst the richest farming areas in the province.

From Enderby we went to Mara on the Spallumcheen river, where a number of low lying, mucky lands were inspected and instruction given for their reclamation.

The last locality visited in British Columbia was Salmon Arm, on Shuswap Lake. Some very promising orchards were seen here, and the district is considered as one eminently adapted to the apple. Though a certain amount of dairying and mixed farming is carried on, it is evident that the future growth of the district is intimately connected with its development as a fruit-growing centre. We were enabled to see many comparatively large areas that had been recently planted, and all gave promise of good returns.

In conclusion, I should like to thank all those who helped to make this tour of such great interest and pleasure to me; many devoting time to driving me over the country in the various districts, explaining much which otherwise would have been obscure, and many kindly and hospitably entertaining me. I should also like to say, as a last word, how gratifying it was to meet so many who were anxious to benefit by our visit. Never have I had the pleasure of speaking to more interested and enthusiastic men than those I met on the field and at the meetings of this visit to British Columbia.

REPORT

OF THE

ENTOMOLOGIST AND BOTANIST

(JAMES FLETCHER, LL.D., F.L.S., F.R.S.C.)

1904.

OTTAWA, December 1, 1904.

DR. WILLIAM SAUNDERS,
Director of Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to hand you herewith a report of some of the most important subjects which have been brought officially under my notice during the past season.

The development of the Division of Entomology and Botany in the various directions has been pushed forward as evenly as possible, with an effort not to allow any work once undertaken to fall behind by giving undue attention to other branches.

Collections.—During the past year, as previously, the collections of insects and plants have been very much increased. Large additions have been made from material collected in the field, as well as also through the kindness of correspondents who have applied to the Division for help in their studies of insects and plants. The great attention which has lately been directed to Nature Study in schools has brought the officers into close contact with many teachers and students in the public schools of the country. There are few things more marked, in matters connected with the development of the country, than the keen interest which is being shown by all classes of society in those investigations which in a general way may be grouped under the head of natural history, and with which the work of the Division of Entomology and Botany is intimately associated. This includes not only a study of insects of all kinds, and plants, wild and cultivated, but also allied researches in forestry, the reclamation of land from the encroachments of the sea or of drifting sand, and also to a certain measure investigations into the habits of birds and animals with which farmers come into contact in their every-day life. This new movement in the schools of the country is giving to the growing boys and girls, who in a few years will be the citizens of Canada, an elementary knowledge of many of the common things which surround them every day of their lives, and which for this very reason are of importance to them. A practical knowledge of animals, plants and natural phenomena cannot but be of enormous assistance to the farmers of the country, whose every occupation is connected in some way with nature. The Nature Study movement is going steadily forward, and it has been a great pleasure to the officers of the Division to be in a position to encourage and help those who have taken it up so earnestly in all the provinces of the Dominion. Our collections here have been of much use in this work, and many visitors have availed themselves of the opportunity of consulting the cabinets.

Insects.—As in previous years, much time has been given to the rearing of insects, eggs or larvæ of many of which have been received by mail from all quarters or collected in the field. An exact knowledge of the preparatory stages of insects, the number of broods, and the time at which they develop, is of the greatest value when devising remedies for injurious species. Careful notes are taken of every species studied, and year by year the collections are enriched by the addition of specimens reared from the egg and prepared for the cabinets, showing all stages of growth, as well as the work of the various species. At the same time, records are kept for reference or for future use in the reports when sufficient data have accumulated or when occasion demands it.

Plants.—Extensive additions have been made to the herbarium, either from specimens sent in by correspondents for naming or as donations; and in many instances fine specimens of rare plants have been acquired by growing the plant from the seed and securing samples at different stages of development. During the year the herbarium has been gone over, and many imperfect specimens have been replaced by better ones, or additions have been made by increasing the series of various species by representatives from other localities.

The collection of weed seeds has been largely increased, and it is now a rare thing for a seed to be submitted by seedsmen or purchasers of seeds, or even to be sent in by students, which cannot be recognized. The institution of the Seed Division, under the Commissioner of Agriculture and Dairying, has had a most marked effect upon the quality of all kinds of seed now offered by seedsmen, and it may be justly said that at the present time, if purchasers will pay a reasonable price, they can easily obtain in Canada all crop seeds of the highest quality, both as to vitality and as to freedom from the seeds of other plants.

Fodder Plants.—The Experimental Grass Plots during the past season have been very attractive to visitors. The season at Ottawa was extremely favourable for the development of all fodder plants, and consequently very complete collections of all the leading hay and fodder plants were made for exhibition at the various fall fairs and other exhibitions where the government has assisted by sending exhibits. A large collection has also been made for the museum at the Central Experimental Farm.

Reclaiming Sand Hills.—A visit was paid to the large tract of shifting sand near Lachute, Que., locally known as the Argenteuil Sand Hill. This is estimated as now covering nearly one thousand acres, stretching along the Ottawa River in an elongated patch about four miles long by half a mile to one mile in width, for the most part entirely destitute of vegetation, but bearing in places clumps of spruce trees, birches, maples, tamaracks and willows. As is usually the case on such areas, the surface is very dry; but a few inches below this there is an abundance of moisture available for the support of any plants which can be protected against the drifting sand. At the request of Mr. Thomas Christie, M.P., I called upon the various farmers living around this sand hill and examined the work they had been doing in their efforts to control the sand. I found, without exception, that every one of them had taken a keen interest in fighting against the common enemy, and much good work had been done in the way of holding back the drift by planting trees and other vegetation. Since 1898 the attention of the Division has been directed to this tract of land, and a few hundreds of plants of the Beach Grass, and also of Norway and White Spruce trees, have been sent to different farmers to be planted on the sand as an experiment; but no extensive work has been carried on by the department. I was much pleased to see the success which had attended the efforts to grow trees on this apparently barren sand hill. The kinds of trees which were noticed growing wild in the scattered clumps which here and there appear, were White Pine, Tamarack, Canada Balsam, White Spruce, White Cedar, Balm of Gilead, Aspen Poplar and White Birch; and round the edges all the ordinary forest trees of the region are represented. In low spots two or three kinds of willows and the Gray Alder flourish. Of shrubs which attracted attention by their vigour and

the extent to which they had spread out in every direction, special mention may be made of the following kinds which doubtless can be made use of in prosecuting this work. The Willow-leaved Meadowsweet (*Spiræa salicifolia*, L.).—This free-growing bush, which not only produces large numbers of running roots or stolons, but also ripens much seed, was found to be covering many acres and spreading rapidly over some low spots in the central portion of the sand hill. This is a native shrub, common in all swamps and low lands. The Red Raspberry (*Rubus strigosus*, Mx.).—A form of this common shrub was seen covering a large area on the farm of Mr. Thomas McGregor, who has encouraged its growth, as well as some other native plants which occur with it. The common Blackberry (*Rubus villosus*, Ait.).—Even more luxuriant than the Red Raspberry was the Common High Blackberry, which rooted freely through the sand and threw up many stems. Both of these berry-bearing plants produce heavy crops of excellent fruit, and it seems as though they might prove a valuable resource to farmers, while at the same time performing the important office of providing a barrier against the encroachments of the sand or as a temporary shelter, while more valuable trees are being grown. Roses.—At various places old and vigorous clumps of Sweetbrier, which were evidently many years old, were seen, as well as of the little old-fashioned semi-double Cinnamon Rose. The Smooth Meadow Rose (*Rosa blanda*, Ait.) was found in spots, covering several yards in diameter and showing an unexpected power to grow up and keep its head above the drifting sand. Shrubs which also showed great vigour and which occurred in many parts of the sand hill, where evidently they had sprung up spontaneously, were the Red Osier Dogwood (*Cornus stolonifera*, Mx.) and the Beaked Hazel (*Corylus rostrata*, Ait.). Of the wild herbaceous perennials growing naturally on the sand, and the growth of which had to some extent been encouraged, the most noticeable were the Common Milkweed (*Asclepias cornuti*, Decne.), the Canada Thistle (*Cnicus arvensis*, Scop.), and Couch or Quack grass (*Agropyrum repens*, L.). There were also seen in some places a few plants of the Strawy Sedge (*Carex straminea*, Schk.), the Ox-eye Daisy and the Dandelion.

The trees which have been experimented with to the largest extent by farmers living in the locality are the White Pine, Canada Balsam Fir, the Norway Spruce, the White Spruce and the Tamarack or American Larch. Of these, the last-named has made the most rapid growth, but seems to require more protection than the sturdy spruces. The Balsam Fir has succeeded as well as the spruces, but is a less valuable tree. The Norway Spruce has been planted only to a small extent, a few hundred trees having been sent from this department three years ago. These were planted carefully, and doubtless will succeed; but it is too early as yet to compare them for this purpose with the White Spruce, which is the favourite conifer and is transplanted from the woods in the neighbourhood. The greatest satisfaction is expressed by all of the way in which willows have succeeded. The kind used for the most part is the large European Tree-Willow (*Salix alba*, L.) known mostly in this country under the name of French Willow. Large numbers of these trees have been started from cuttings and have in a single year made a remarkable growth, even from small cuttings put in with little labour in a furrow made by a plough. Such plantations were seen on the farms of Mr. John Doig and Mr. Walter Smith. On the edge of one of Mr. Doig's plantations the sand had been drifted away by the wind so as to expose the roots of one of his trees. These, by actual measurement, extended for forty feet from the central point, showing the great value of the willow as a sand binder, both from its rapid growth and from its great root production. An observation of much interest, as showing the power of the Canada Balsam to resist destruction by sand, was that this tree, when covered up to a certain extent with sand, threw out large numbers of roots from the branches which were partially submerged. (See Plate II., fig. 10.) Many samples of such branches were found upon trees which had their roots and trunks covered up with from six to ten feet of sand. Experiments with Beach Grass and the Sea Lyme Grass have been very satisfactory, particularly where the former has been planted on

exposed banks. In low, undisturbed spots the Sea Lyme Grass has succeeded rather better than the Beach Grass. Tufts of both of these grasses were found in some places to have extended four feet in each direction by the end of the second year, and on Mr. Walter Smith's land one clump was found which had a thick growth four feet across in the centre, with five smaller shoots round it and 18 shoots just showing through the sand, which will produce tufts of leaves next spring at a radius of twelve feet from the centre.

It is hoped next year to encourage this work by sending a large consignment of Beach Grass and several thousand cuttings of those willows and poplars which have shown the greatest vigour at Ottawa and at our western experimental farms. The enthusiasm and interest shown in this subject by the farmers themselves, every one of whom has already gone to much trouble and expense, is most encouraging. I can see no reason why in a few years this large tract of sand may not be brought under control.

Meetings.—Meetings of farmers, dairymen, fruit growers, &c., have been attended whenever other official duties would allow of my absence from Ottawa.

December 28, 1903: St. Louis, Mo.—Annual meetings of the Society for the Promotion of Agricultural Science, of the Association of Economic Entomologists and of the American Association for the Advancement of Science.

January 29, 1904 : Cowansville, Que.—Convention of District of Bedford Dairymen's Association.

February 12 : Ormstown, Que.—Huntingdon Dairymen's Association.

April 18 : Perth, Ont—Horticultural Society and address to school children of the Public Schools in the town hall.

May 5 : St. Catharines, Ont.—Meeting of fruit growers to discuss the San Jose Scale remedies.

May 6 : Toronto.—Normal School : Address on Nature Study.—Toronto Branch of the Entomological Society of Ontario and Toronto Horticultural Society—joint meeting : Address on 'The Opening of Spring and Spring Work.'

June 14 : Amherst, N.S. ; and June 18 : Halifax, N.S.—Meetings of Maritime Stock Breeders' Association and Nova Scotia Farmers' Association.

June 21 to 24 : St. John, N.B. ; June 16 : Kentville, N.S.—Address before King's County Board of Trade on 'Orchard Insects.'

June 27 and 28 : Gagetown, N.B.—Address before Farmers' and Dairymen's Association on 'Farm Insects,' and attending spraying demonstration in orchard.

July 11 to August 11.—In Manitoba and the North-west Territories, holding weed meetings for the North-west government.

September 5 : Brome, Que.—Attending the Brome County Fair and judging horticultural exhibits.

September 9 to 17 : Halifax, N.S.—Attending the Nova Scotia Provincial Exhibition in company with the Dominion Live Stock Commissioner. Meeting farmers and fruit growers in the Farmers' Pavilion and delivering addresses on Noxious Weeds and Injurious Insects.

September 19 to 23: St. John, N.B.—Attending Canada's International Exhibition and judging the natural history exhibits sent in by the school children of the province. This competition is worthy of special mention on account of the excellence and number of collections sent in. No less than 83 separate collections, aggregating nearly three thousand specimens, were on exhibition and formed a most attractive exhibit. For the most part, the specimens were well preserved, neatly mounted and labelled. The identifications in most of the collections were also as accurate as could be expected under the circumstances. On the whole, I believe that this competition was the most extensive and best managed of any similar effort which has ever taken place in Canada. The example of the Exhibition Association may well be followed by other similar institutions.

September 24 to 30 : Charlottetown, P.E.I.—Provincial Exhibition. Attending meetings and giving addresses in the Farmers' Pavilion upon Weeds, Hay and Pasture Grasses and Injurious Insects.

October 19 : Lachute, Que.—Visiting the Argenteuil Sand Hill and discussing with farmers means of controlling the drifting sand.

October 21 : Whitby, Ont.—Visiting the Model Fair Grounds with the Live Stock Commissioner and examining the illustration plots of various crops; and also the fodder crops grown in the district.

October 26 and 27 : London, Ont.—Annual meeting of the Entomological Society of Ontario : 'Injurious Insects of the Year,' 'Entomological Record for 1904.'

November 15: Toronto, Ont.—Provincial Fruit, Flower and Honey Show: Address on 'The Value of Bees to the Fruit-grower.'

In addition to the above, Mr. Arthur Gibson attended the County of Carleton Annual Exhibition at Richmond, Ont., and judged the natural history exhibits made by the teachers and school children of the county. These exhibits were on the whole very satisfactory, and showed good careful work on the part of the teachers.

Mr. Gibson also attended the annual meeting of the Entomological Society of Ontario at London, and took an active and acceptable part in the proceedings, reading two papers : 'Further Notes on Basswood or Linden Insects,' and 'The Columbine Borer (*Papaipema purpurifascia*, G. & R.).

Acknowledgments.—I have again gratefully to acknowledge many favours from specialists who have assisted me with identifications of many specimens of insects received for the collections during the past year. My thanks are specially due to Dr. L. O. Howard, Chief of the Bureau of Entomology at Washington, and members of his staff, particularly Dr. H. G. Dyar, Dr. W. H. Ashmead, Messrs. Schwarz, Coquillett and Busck; also to Prof. J. B. Smith, of New Jersey; Mr. W. D. Kearfott, of Montclair, N.J.; Prof. J. S. Hine, of Columbus, Ohio, and Rev. G. W. Taylor, Wellington, B.C.

Valuable additions to the collections of insects have been made by the following:

Mr. F. H. Wolley-Dod, Millarville, Alta.—A collection of named noctuidæ from Alberta.

Mr. T. N. Willing, Regina, N.W.T.—Many specimens of insects of all orders from the North-west Territories.

Mr. Norman Criddle, Awcme, Man.—Many rare moths and other insects from Manitoba.

Mr. W. Metcalfe, Ottawa.—A large collection of minute diptera and other insects beautifully pinned, mounted and labelled.

Mr. A. W. Hanham, Victoria, B.C.—A large collection of pinned hymenoptera, diptera and hemiptera taken in Manitoba and British Columbia.

Mr. E. F. Heath, Cartwright, Man.—A collection of Manitoban moths in papers.

Mr. C. H. Young, Ottawa.—Specimens of rare moths taken at Ottawa.

Mr. E. P. Venables, Vernon, B.C.—A collection of named *Bombi* taken at Vernon, B.C.

Correspondence.—The correspondence of this Division has been sufficient during the past year to take up every minute of the time of the officers which could be spared from time necessary for investigation. Many thousands of specimens of insects and plants have been received from students for naming. This requires much time, but is of great value in the work of the Division in bringing the officers into contact with students all over the country and in learning of the occurrence of many insects and plants, which otherwise would not come to their notice. From December 1, 1903, until November 30, 1904, the number of letters, exclusive of circulars, registered in the Division as received on official business was 3,231, and the number despatched was 2,909.

I have the honour to be, Sir,

Your obedient servant,

JAMES FLETCHER,

Entomologist and Botanist.

DIVISION OF ENTOMOLOGY.

CEREALS.

The season of 1904 in all parts of the Dominion has been remarkably irregular and uncertain. Extensive areas have suffered from drought, while in other places there has been trouble from too much rain at certain periods ; crops, accordingly, have been very irregular. Through the greater part of the Maritime Provinces and in the eastern part of the province of Quebec, a prolonged drought during the months of June, July and August reduced enormously all hay and grain crops. In the western portion of the province of Quebec and in eastern Ontario, weather conditions were very favourable and excellent crops of grain and hay were secured. In western Ontario, on the other hand, and in the whole of the province of British Columbia, hot dry weather prevailed and somewhat reduced crops of all kinds. The Ontario November crop report describes the wheat crop as below the average and rather light in weight ; barley as one of the most successful crops of the year; oats a splendid crop, yield and quality most gratifying. Throughout the Dominion, however, the season on the whole has been cool and backward. In the North-west Territories and Manitoba the growing season began late; but with improved summer conditions and no killing frosts until rather later than usual, a large crop was reaped. The quality was not quite as high as was at one time hoped for, owing to rain at harvest time and slight frosts in some localities, and also to a certain amount of injury by rust. Rust is almost unknown in the West as a serious enemy of cereal crops; but during the past season a more severe epidemic of this destructive parasite made itself manifest towards the end of August, than has ever previously been recorded. Mr. J. R. C. Honeyman, the Deputy Commissioner of Agriculture for the North-west Territories, although stating that the presence of rust last summer was a factor to be considered, claims that practically it did not affect the crops in the Territories to any appreciable degree. Writing on November 16, he says: 'There is a large amount of very good grain in the country, and prices are satisfactory. However, a comparatively small proportion of the crop has been marketed, owing to the continued fine weather, which enables farmers even at the date of writing to continue their fall ploughing.'

Mr. J. R. Anderson, Deputy Minister of Agriculture for British Columbia, writes : 'The abnormally dry season which extended through the whole of the province, had the effect of reducing considerably the production of all crops in those parts where irrigation is not practised, because it is unnecessary. Spring wheat was generally a failure where it is grown for milling purposes. Fall wheat was better, but on the whole, milling wheat was short. Nevertheless, some fine samples were produced. Kansas Red from Spallumcheen weighed 69½ lbs. per bushel, with a fine, hard, plump grain. Oats and other small grains were good where the seed was got in early, and on irrigated land. In dry regions these crops were indifferent.'

In Northern Alberta the summer was fine and dry, and grain crops were better than they had been for two or three years, except in some instances where poor seed oats had been sown. No mention was made of rust. In Manitoba, however, the injury by the Black Stem Rust caused great anxiety to farmers. Some crops were actually cut green or before they were ripe to save further damage. The districts most affected were between Brandon and Winnipeg and in the south and west of the province. Loss from this cause was not confined to the West. Reports from Ontario and Quebec mention rust on wheat, oats and barley, and a consequent shrinkage in those

crops. An undetermined injury referred to as 'Dead Heads' by settlers also occurred rather widely in Manitoba just before wheat harvest. Unfortunately, no cause for this injury which involved patches of from two to fifteen feet in diameter, could be discovered by my correspondents, who made investigations in accordance with suggestions sent to them. Neither fungus nor insect enemy could be discovered. Mr. Geo. H. Greig, Secretary of Live Stock Associations of Manitoba, wrote that the injury ceased about August 20, and that in speaking with the farmers in the district where this occurred, the opinion seemed to prevail that new land was worse affected than old, and he estimated the loss in the fields which showed most of the injury at about 5 per cent.

Among insects which have attracted attention by their numbers on cereal crops during the season of 1904, mention may be made of the following:—

Wireworms.—Wireworms in grain fields were complained of in New Brunswick, near St. John, on Prince Edward Island, at Kensington, and at Qu'Appelle in the North-west Territories. These troublesome larvæ, for which up to the present time no satisfactory remedy has been discovered, did much harm by eating into the young sprouting grains of wheat. It was noticed by Mr. William Henley, of Qu'Appelle, that oats sown on the same land where wheat was being destroyed, were not injured by the wireworms. The destruction of the wheat, however, was considerable. He writes under date June 20:—'Wireworms are destroying our wheat crop in the Wascana District (T. 13, R. 15, W. of H., 30 miles south of Qu'Appelle). This is heavy hummocky land full of humus. I broke a hundred acres last summer, disked it in the fall and harrowed it before and after seeding this spring. I shall not get over half a crop from it. I am breaking another hundred acres this summer, and should like to avoid this trouble next season, if possible. Would more cultivation in the spring have any effect on this insect, or would you recommend putting on extra seed? I don't think this worm does much harm after the wheat has germinated. We had two weeks of cold weather this spring after seeding, and the seed did not start to grow for some time. This was when the wireworms did most harm.'

A remedy which has given a measure of satisfaction to those who have tried it, is to plough the land twice in autumn—once in August, when the wireworms (the larvæ of several species of Click Beetles) change to the pupal condition, in which they are soft and easily injured, and then again in October or later, when the perfect beetles have formed but are still too soft and delicate to stand the cold of autumn and winter if their pupal cell is broken. This late ploughing also exposes them to many enemies. In the North-west, as Mr. Henley has pointed out, it is very rarely possible to plough land as late as October. The present open season, nearly up to the end of November, gives farmers a good opportunity to try this remedy. It has been noticed that oats are not so much attacked as wheat; and barley and rye are even less so, therefore, when land is found to be badly infested with wireworms, it will be advisable to sow other crops than wheat.

Cutworms in Grain.—In the middle of July the 'Nor'-West Farmer' referred to the Division several complaints of injury to wheat crops by cutworms (Plate I, fig. 1), and specimens were received from Manitonas, Man. These proved to be the Red-backed Cutworm (*Paragrotis ochrogaster*, Gn.), which is a very general feeder, but, as a rule, restricts itself in a large measure to the weeds growing in grain crops, instead of attacking the grain. Occasionally, however, as in the oat crops of Manitoba in 1901, widespread injury was done by this cutworm; and, in 1900, as well as in 1901, several undoubted instances were reported of its attacking wheat. This bad habit, however, must be considered exceptional; and it is particularly to low vegetables and root crops that the Red-backed Cutworm does harm. The Glassy Cutworm (*Hadena devastatrix*, Brace), a greenish white caterpillar with a red head, which works beneath the ground, damaged wheat fields seriously in the neighbourhood of Virden, Man.

In grain fields it is difficult, as a rule, to apply remedies for cutworms; but, as many of the different kinds assume a marching habit as they clear away the food be-

fore them, it is frequently possible to prevent damage to a large extent by applying poisoned bait in advance of their line of march. The poisoned bran remedy, which gives such remarkably good results against all surface feeding cutworms, is probably the best form of bait. This can be scattered lightly through the grain near the spots where the caterpillars are numerous, and the small particles of bran will be found by the cutworms, which eat this material with avidity. For the Glassy Cutworm, which feeds almost entirely underground, this remedy would be of little avail, and the best means of combating this insect is to keep the land to be used for small grain crops the following year as free as possible from long grass and weeds in the autumn before. Prairie or sod land which is to be broken for seeding the next year should be fed off as late as possible or mowed before breaking. In this way the female moths will not be attracted to the tall vegetation on such land when laying their eggs.

Grasshoppers.—I visited the districts in Central Manitoba lying between Treesbank and Douglas in the middle of July, and saw no traces of injury by locusts. Mr. N. Criddle, of Aweme, writes under date of November 1: 'As was anticipated, locusts did not hatch out in sufficient numbers to cause any loss to farmers in this district. A few reports of their being unduly numerous were heard in the spring from places south-east of here; but, as far as I can learn, very little, if any, damage was done. The gradual disappearance of these troublesome pests seems to have been brought about chiefly by the multiplication of their well known parasites, mention of which was made in my last year's report.'

The kinds of grasshoppers which have been devastating the crops in Central Manitoba for the last four years are the Rocky Mountain Locust (*Melanoplus spretus*, Uhler), the Lesser Migratory Locust (*M. atlanis*, Riley), and Packard's Locust (*M. packardii*, Scud.). The two parasites referred to by Mr. Criddle are two blister beetles, *Epicauta scricans*, Lec., and *Epicauta pennsylvanica*, DeG., as well as two or three kinds of *Tachina* flies.

In some of the dry regions of British Columbia another species of locust, *Camnula pellucida*, Scud., appeared in a few places, and did a good deal of harm on the ranges. Mr. George Packham, of the Plateau ranch, Okanagan Mission, writes on June 25: 'Grasshoppers are coming out in thousands again this year. Last year they destroyed most of the crops and damaged the young orchards considerably. Is there nothing that can be done to check them? Is there not a fungous disease that the Australian government supplies to settlers? If so, could not our government supply it to us at cost price? It is important that we get it immediately, or we shall lose acres of vegetables and thousands of young trees.' In view of the great success which had been obtained by Mr. Criddle in controlling vast hordes of grasshoppers in Manitoba in a practical way with the Criddle mixture, I recommended Mr. Packham to try that mixture in the Okanagan country. It has been noticed that the Pellucid Locust, which was the species there prevalent, has the habit of occurring in dense swarms in rather restricted localities, and therefore gives a good opportunity for the application of poison.

The Criddle mixture, for convenience, is made in quantities of half a barrel at a time. It consists of fresh horse droppings 100 parts, Paris green 1 part (=1 pound), and salt 2 pounds, dissolved in half a pail of water, and the whole mixed together. In this connection, Mr. Criddle says: 'We usually measure with a three-gallon patent pail, because it is more convenient to farmers than to weigh the material. Five pails we calculate approximately equal 100 parts of horse droppings, and each part equals in bulk one pound of Paris green. The great drawback in using weights is that horse droppings are not always of the same weight.'

The propagation and wholesale cultivation of the fungous disease for the destruction of grasshoppers of all kinds, which is mentioned by Mr. Packham and has been inquired about from time to time by many other correspondents, I regret to say, has not proved to be, on the whole, of much service in fighting outbreaks of injurious locusts.

For a short period, and in restricted localities, with all conditions favourable, good results have occasionally been obtained; but the difficulty of preserving the spores alive and using them when required, has been so great that all entomologists who have experimented with the fungus have, after a short time, relinquished the effort in favour of other methods not so dependent for their most effective use on climatic conditions. Hopper dozers and other mechanical contrivances have proved of much service; but the best results have followed agricultural methods of control, such as the early ploughing down of all stubble lands, in which by preference the eggs are laid, before the young emerge in spring or have grown to such a size as to be able to save themselves by hopping or flying, so as to avoid being ploughed down and buried.

The Hessian Fly (*Cecidomyia destructor*, Say.).—Injury by this destructive enemy of the wheat crop has been slight this year. Most reports merely refer to its absence. Last year specimens were found as far west as Indian Head, N.W.T. In Manitoba it has done less harm by far than in 1903. Mr. Norman Criddle, who has been on the lookout for it, says: 'The only report of this insect comes from Mr. Cooper, of Treesbank, who states that quite a number of puparia were to be found on his stubble fields this autumn and that he estimated the damage on his farm at about half a bushel to the acre. Elsewhere in the province, it is just possible that this insect may have escaped notice on account of the damage done by rust. There was no appearance of Hessian Fly here at Aweme.'

Prof. F. M. Webster, who is making a special study of wheat insects in the United States, writes at the end of this season: 'I found Hessian Fly in large quantities in North Dakota, quite as bad as in many places further south. You will be interested in hearing that from a lot of stubble collected west of Fargo, I have not reared a single adult this autumn; but from stubble collected at Lincoln, Nebraska, we get plenty of adults, showing that there must be a dropping out of the fall brood somewhere between these two localities.'

This observation confirms the opinion that there is only one brood of the Hessian Fly each year in our western wheat fields. This is an important fact, as indicating a proper remedy, and shows the value of cutting wheat high and then burning over the stubble before the time when the flies emerge in spring. In the Ontario November Crop Returns we find: 'The crop suffered much less than in recent years from Hessian Fly and other insects;' and 'in the new fall wheat little injury was complained of, compared with the ravages of this pest during the past three or four years.' In Prince Edward Island, where the Hessian Fly is always present to some extent, little harm was done, but specimens of infested straws were received from Mr. A. M. McMillan, of Eldon, P.E.I.

Wheat-stem Sawfly [*Cephus pygmæus*, L. (?)].—The intermittent manner in which this insect attacks wheat in the North-west was again demonstrated this year. It was not reported from any of the localities where it did harm during the past two years. The only place where a crop was injured conspicuously was at North Portal, Assa. Mr. George Harris writes under date August 24: 'I send samples of wheat injured by a small white worm. The attack is worst on the edges of fields, but is present all through the grain. Where the plants stand thick, you can cut with a binder; but where thin, the wheat falls down and there are patches three and four feet square, which are quite flat.'

The worm which causes this breaking of the straw is the larva of a slender black four-winged sawfly, about one-third of an inch in length, banded and spotted with yellow. The eggs are inserted into the straw by the females near the top of the stem; and the grub on hatching eats its way down to the root, near which it passes the winter in a cocoon spun inside the stem, but above which it has first gnawed almost through the walls of the straw, so that about harvest time injured stems fall over easily and break off, leaving the grub inside the stubble, where it remains, and about June of the following year turns first to a pupa and then to the perfect fly. Burning over

stubble fields and ploughing down all land left for summer-fallow early, so that the cocoons may be destroyed by the burning or buried so deeply that the flies cannot emerge, are the remedies recommended.

The GRAIN APHIS *(Nectarophora granaria,* Kirby).—It is probable that two or three species of plant-lice have been spoken of collectively by correspondents under the name of the Grain Aphis, as there is a remarkable difference in the appearance and colour of many of the plant-lice described in their letters, and very few send in specimens of what they consider a so well known insect. The grain plant-lice were more complained of this year in the West than any other enemies of cereal crops. They were exceedingly abundant in many places, and did some harm by sapping the stem and grain and causing shrunken wheat. Specimens were sent from New Brunswick by Mr. W. H. Moore, of Scotch Lake, and reports of unusual abundance were received from several places in Ontario. Nevertheless, there was little appreciable injury to grain crops in the East. In Manitoba and the North-west grain plant-lice were in places so abundant as to cause a good deal of anxiety. Mr. T. N. Willing, the Chief Territorial Weed Inspector, of Regina, reports that the Grain Aphis was very plentiful at some points, particularly north of Wapella, N.W.T. 'They were so abundant on Mr. F. Carr Dufton's farm, Wapella, and that of Mr. W. M. Gordon, Hazelcliffe, that the binder was actually stopped by reason of the canvas slipping on the rollers, from the slipperiness caused by the crushed plant-lice, and these were cleared off from the platform by the shovelful.'—T. N. WILLING.

'Pilot Mound, Man., Aug. 17.—I send wheat heads attacked by the Grain Aphis. I have a large acreage in which the grain is infested; but the only harm I can see that they do so far is to delay ripening. In walking only a short distance into the standing grain my clothing became covered with these insects.'

'Aug. 28.—The plant-lice which were so abundant when I last wrote, soon afterwards suddenly disappeared. They got wings about August 18 and flew away, I hope, never to return.'—PHIL. W. ROBINSON.

'Winnipeg, Man., Sept. 6.—We send sample of wheat received from a farmer at Wawanesa, Man. You will notice that it is affected by a small insect which is working on the head. The farmer writes: "The heads of the wheat are covered with a small insect of a green and black colour, which seems to be a bad pest. The heads of the wheat are covered with them and there must be millions in a single field. They seem to be sucking out the juice of the straw and the berry.'—W. J. BLACK, Editor *Farmers' Advocate.*

'Yorkton District, Assa. (30.25.2.W. of 2nd), Sept. 13.—There was an insect on the grain this year which, had it come sooner, would have done a great deal of damage. There are millions of them on the oats, and I understand they are on the wheat also. They cluster around the kernel.'—A. C. GIBSON.

So far, no treatment has been discovered for controlling plant-lice on grain crops; but fortunately, they very seldom affect the output to any considerable extent; for an excessive occurrence of these insects is invariably attended by a correspondingly abundant development of parasites which feed upon them.

The WHEAT MIDGE *(Diplosis tritici,* Kirby).—It is many years since any noticeable loss from the larvæ of the Wheat Midge, usually called 'The Weevil' by farmers and millers, has taken place. Fifteen years ago the injury through the country was enormous, but suddenly, about 1889, the insect practically disappeared from our wheat fields. In 1898 a rather severe outbreak—the loss amounting to about 25 per cent of the crop—appeared as suddenly in the Niagara Peninsula, particularly along the lake shore in the county of Lincoln. Nothing has been heard of the Wheat Midge since that time, there or elsewhere, until the past summer, when specimens were sent from the fertile Chilliwack district of the Fraser River valley, in British Columbia. Mr. J. R. Anderson, in his report on the crops of the year, says: 'The Wheat Midge

(*Diplosis tritici*, Kirby) made its appearance at Chilliwack, but does not seem to have shown itself elsewhere. Where noticed, the infested wheat was destroyed by fire.'

Specimens of wheat heads more heavily infested than any I have ever seen, were received from Mr. Henry Kipp, of Chilliwack.

'Chilliwack, July 27.—I enclose heads of wheat infested by a small red maggot. There were a few last year, but this year my field is ruined. Please let me know what it is, and send a remedy if there is any. I believe there are hundreds of acres more or less injured by this insect. You will be doing the farmers of this district a great favour if you publish a remedy for it so that we may be ready to protect ourselves another year.'—R. ROBERTS.

'Chilliwack, July 28.—I enclose heads of wheat infested with a little red insect, which is attacking all the wheat crops here. Is there any remedy? I suppose not, as the wheat is so far advanced and is just beginning to ripen. I hear rumours of barley being attacked. So far, oats and peas are not. I see under the microscope this little insect resembles a minute worm. Most people, including myself, are going to cut the wheat green.'—G. MAXWELL STUART.

'Chilliwack, Nov. 24.—As far as I can hear, wheat was damaged by the Wheat Midge more or less all over the lower Fraser valley; the extent of the injury varied according to locality and to the state the wheat was in when the Midge attacked it. On the whole, the average would be, I think, less than one-third of the crop for the turn out. I heard of one farmer who only got 10 sacks of wheat off 10 acres; another got 25 bushels off five acres; he estimated the crop, before the Midge attacked it, at at least 20 bushels to the acre. On the other hand, Mr. Evans, of Sumas, had his wheat in very early; and it was not injured at all. I suppose the wheat had got too hard for the Midge; and for the same reason the fall wheat here was not hurt at all. I do not put in much wheat, my land being better suited for clover and peas; but off two acres which looked very well before the Midge came, I got only about two sacks. A good many cut their wheat for hay as soon as they knew it was attacked. Do you think this insect is likely to occur again next year? It would be a useful hint to farmers if you could include in your report a suggestion as to whether it would be wise to sow much wheat or not.'—G. MAXWELL STUART.

As to sowing spring wheat next year in the Chilliwack valley, it would certainly be wiser not to do so, but to use the land for some other crop such as oats or barley, which are not attacked by the Wheat Midge. It is, of course, possible that the Midge may not be abundant next year; but it is much more likely to be present in some numbers, which would make it unwise to grow wheat when the land can be used for so many other valuable crops.

'Chilliwack, November 28.—*Re* losses from Wheat Midge in this valley, I may say they were even more serious than I first thought. After attending a number of threshings, I am sure fully half of the wheat crop was destroyed by it; there would be found several bushels of the grub underneath the machine after it had worked one or two hours. But a few like myself cut their wheat and made hay when the insect was found to be bad; but I may say the loss was not felt as bad here as it would have been in a wheat-growing district: for the farmers here only grow wheat for feed, and only a comparatively small acreage is annually sown to wheat; so the loss, although considerable, will not be felt very much, and the chickens will have to eat something else. I notice an increase in the acreage of fall wheat sown this fall; for, strange to say, the insect does no harm to fall wheat, and a few fields of very early spring wheat escaped the Midge. I have just rubbed out a few heads of the wheat which I cut for hay, and find the grub still there, with no change, as far as I can see, since I first noticed it.'—R. ROBERTS.

All the samples of infested wheat received were remarkable for the enormous numbers of the larvæ clustered round the grains in each floret; and, although few farmers reported injury by the Midge, this was without doubt great where the insect

occurred. Immediately on receipt of the samples an article was prepared for the *Province* newspaper of Vancouver, B.C., in which the insect was described and the best steps to take were mentioned, so that as much as possible loss might be minimized in the future. The Wheat Midge possibly attacks some grasses, but has never been detected, as suggested above, on barley nor upon oats and peas.

The Wheat Midge and its attack are thus described in my report for 1888, page 49, which I reprint here, as I have nothing further to add to it in the way of useful information:—

'The Wheat Midge is more widely known in Canada under the inaccurate designation of 'Weevil,' a term which must be discouraged, because it belongs to another class of insects altogether. The weevils are hard-shelled beetles, with elongated snouts, while the Wheat Midge in its larval stage is a legless maggot, and, when in the perfect state, a delicate gnat-like creature with gauzy wings. The life history of the Wheat Midge, as at present understood, is as follows:—During the month of June, just when wheat is in blossom, tiny yellow midges with black eyes and yellow bodies may be seen flying over the fields, particularly on dull days or towards evening. Large numbers of the same midges may also be seen in houses as soon as the lamps are lighted. These are the Wheat Midge and the parents of the Red Maggot of wheat.

'The body of the female fly is prolonged into a long slender tube which can be extended or drawn in at pleasure. With this tube, which is called the ovipositor, she pushes her minute eggs down between the chaff of the green wheat ear. In about a week these eggs hatch into small transparent yellowish maggots, which at once attack the forming grain. Gnawing through the outer skin of the kernel of wheat, they extract its juices and prevent it from filling out properly. As these larvæ grow older, they gradually become darker in colour until they acquire the tint which has given them the name they are best known by in England, "the Red Maggot of the wheat." Grain injured by the Midge has a characteristic shrivelled appearance, known amongst millers as "fly struck." There are sometimes four or five maggots to each grain in an ear.* As soon as the maggots are full grown they either work their way up between the scales of chaff and fall to the ground, or remain in the ears until the crop is carried. Those which fall to the ground—and these are by far the most numerous—penetrate about an inch beneath the surface, where they spin a small cocoon of exceeding thinness, which fits so closely to their bodies that it is sometimes thought to be only the skin hardened, in the same manner as takes place in the case of many other flies when they pass through their pupal or quiet state. It was generally supposed that the perfect flies from these pupæ did not appear until June in the following year. This, however, is not always the case, for, on a warm, damp evening in August, and again in the beginning of September, 1888, large numbers flew into my study and were killed at the lamp. Prof. F. M. Webster, a special agent of the United States Department of Agriculture, on one occasion bred considerable numbers of perfect Midges in the month of July, from heads of wheat which had been badly attacked by the red maggots during the previous month; and, off and on, during the rest of the summer until November, he caught the perfect insects at large. In the report of the United States Entomologist for 1884 the same observer records as follows:—"From September 4 to 15, I not only found larvæ in considerable abundance under the sheaths of volunteer wheat, but adults too in the same situation, and also on the outside of the plant or hovering above the upper leaves. From a quantity of this wheat placed in a breeding cage, on September 7, appeared three or four adults." Not only, then, did these maggots of June produce perfect flies that same summer, but there was a second brood which had time to lay eggs in the young fall wheat. That this insect has a double life history, living both in the ears and later in the season in the shoots of young

*There were from 10 to 15 in almost every instance with each grain in the heads sent from British Columbia this year.

wheat plants, is an important discovery made by Prof. Webster, and suggests another means of checking its ravages.'

Remedies.—The remedies for the Wheat Midge, as for all other insects which attack crops, depend largely upon its habits and the way in which it passes the winter. Those methods which have given the best results are as follows :—

1. Deep ploughing directly the crop is carried, so as to bury the larvæ so deep that the flies cannot work their way out through the soil.

2. The burning of all chaff, dust and rubbish known as 'screenings' or 'tailings' from beneath the threshing machines, as these contain many of the larvæ which are carried with the crop. If fed to chickens or domestic animals, this should be done in a place where none of the puparia can escape destruction.

3. Clean farming, including the cutting of all grasses along the edges of fields and the ploughing down of all volunteer crops found in wheat fields before winter sets in, so as to destroy an autumn brood where one exists.

4. The cultivation of such varieties of wheat as experience has shown are least affected by this insect. There is a great difference in kinds of wheat in this respect, and from time to time so-called 'midge-proof' varieties have been introduced, but it is probable that there is no truly midge-proof variety of wheat as yet known.

The Pea Weevil *(Bruchus pisorum,* Linn.).—The satisfactory state of affairs referred to in my last year's report as to the sudden and remarkable decrease in the numbers of this pest has continued, and, even to a greater degree, during the summer of 1904. This sudden cessation of activity on the part of such a persistent enemy cannot be accounted for by any one cause; but it must be claimed to be due, to some extent at any rate, to the persistent work which has been done by entomologists in stirring up farmers to greater care in treating their seed pease before sowing them, and in harvesting and treating the crop as soon as possible after it is ripe. Many farmers, for fear of loss from the depredations of the Pea Weevil, gave up growing peas altogether during the last two seasons. In 1903 the numbers of the Pea Weevil were perceptibly reduced, but no natural parasites such as frequently bring down the numbers of other insects when they increase unduly, could be detected to account for this. The winter of 1903-4 was more severe, both from its duration and the intensity of the cold than has been experienced for many years. There is no doubt that the cold weather destroyed many of the weevils which had emerged in the autumn and were hibernating around barns and buildings. It is probable, too, that many of those still remaining in the seeds through the winter were also killed by the cold. In some rather extensive experiments carried on during two or three years to decide whether there was any exact limit to the low temperature which could be borne with impunity by the Pea Weevil, I found that beetles exposed inside the pease, both with the skin of the pea intact or with the cell cap pushed off, were killed at between 18 to 20 degrees below zero, Fahr. On several occasions during last winter the thermometer dropped lower than 20 degrees below zero, Fahr., in these districts of Ontario where the best seed pease are grown. Mr. Geo. E. Fisher, a practical farmer and careful observer of insect life, writing from Burlington, Ont., on September 29, says : 'The pea crop here is now being threshed. It is a good crop and characterized by the entire absence of bugs. This substantiates my contention that cold weather settles the Pea Bug. I believe there will be a large acreage put in to peas next year.'

Prof. C. C. James, in his November crop report for Ontario, says : 'The round or common field-pea has not been widely sown during the past three or four years owing to the weevil or "bug." The yield and general quality of pease this season, however, will do much to restore confidence in the growing of this crop. The injury from weevil was comparatively slight, and a larger area of peas may be looked for next year.'

Mr. J. D. Evans, President of the Entomological Society of Ontario, who has made inquiries for me in Prince Edward county, one of the most important districts in Canada for the production of first-class seed and pease, writes on November 11: 'The Pea Weevil was not destructive at all this year; in fact, it seems to have entirely disappeared. There were none found at Picton, Bloomfield, Wellington, Trenton or Frankford. Mr. Cooper, of Bloomfield, and Mr. W. P. Niles, of Wellington, both well known to you as first-class men, report its apparent disappearance in the abovementioned localities.'

I draw special attention to the great diminution in the numbers of the Pea Weevil at the present time, in the hope of inducing growers to avail themselves of this exceptional opportunity of pressing home their advantage now when the infestation is so slight, and when, therefore, every insect killed is of much greater importance in the conflict than when Pea Weevils are occurring in the incredible numbers in which they existed in Canada only three years ago. I again repeat that I can see no reason why the Pea Weevil should not be entirely wiped out in Ontario.

There are special features about the attack of this insect which render its control a simpler matter than is usually the case with injuries of an equal magnitude. The Pea Weevil is not a native of North America, and has no other known food plant than the cultivated pea, which, being an exotic plant, will not live over the winter in our climate if seed is left in the open field; consequently, every seed sown for the pea crop of the year must, before it is sown, have been under the control of some one by whom it could have been treated before sowing to destroy the contained weevil if it had one. Fumigation with bisulphide of carbon is a certain, effective, easy and cheap remedy, which is well known and can be applied by any one. If all growers of pease, will combine to do this this year, when on account of the cool season of 1904, it is not likely that many of the weevils have left the seed, by far the greater number of the Pea Weevils now remaining in the country can be destroyed before another season opens. This, however, alone will not be sufficient. The knowledge of the life history of the insect must be made much more widely known to farmers than is the case; for, notwithstanding all that has been written on the subject and the attention which has been given to it at farmers' institute meetings, I have received during the past season a great many inquiries as to the best means of treating pease before sowing; and further steps must be taken at the proper time of the year to spread more widely a general knowledge of the subject, so that those growing seed and sowing pease, may understand the reason why certain steps are advised. My recommendations are :

1. That all pease for seed should be treated before they are sown, whether the weevil is thought to be present or not, and that seeding should be as early as can be, so as to get the crop ripe and ready for treatment at the earliest possible season.

2. That pea-growers should harvest their pease as much on the green side as is safe, rather than, as is usually done, waiting until they are dead ripe. This has many advantages; not only is the straw of much higher quality for feed, but the seed is heavier and better for every purpose. The pease should be threshed as soon as dry enough, and then fumigated at once. The weevils will not have completed their growth and will have destroyed a smaller proportion of the bulk of the seeds than if they were left until later in the winter. It is certain that weevils in all stages of growth may be killed inside the pease by fumigating with bisulphide of carbon. Consequently, if growers will sow early and harvest and thresh a little earlier than usual, and either themselves treat their seed immediately or sell to the grain buyers, who for their own sakes will do this, much good must surely result. When for any reason pease cannot be treated at once or disposed of, they should be bagged up and the sacks tied up immediately so as to prevent the escape of any weevils which might emerge in the autumn. When the grain is required for feeding, and therefore it is thought not necessary to fumigate, pease should be ground as soon as they are dry enough; and, for the convenience of grinding and to prevent the meal from becoming musty, some old pease should be mixed with the new before passing them through the grain grinder.

3. That everybody who understands the gravity of this question should use every endeavour to persuade all growers of pease to abstain from sowing any pease which contain living weevils, and, when purchasing seed, to refuse determinedly to buy any without an assurance from the seed merchant that they have been treated, and, even with this assurance, to examine for themselves to see that any contained weevils are really dead. There are two points which should always be remembered by those who purchase pease for sowing. Seeds which have been injured by weevil are so much reduced in vitality and producing power that they are only worth about one-quarter as much as sound seed, and also, that treatment with bisulphide of carbon in no way injures the pease, whether they are to be used for seed or to be fed to stock.

FIELD CROPS.

The irregular nature of the weather during the summer months of 1904, which has already been referred to under cereal crops, was manifested even more plainly by its effects upon fodder crops. Good hay crops were the exception, perhaps the best being secured in western Quebec and central and northern Ontario. Corn was nowhere heavy nor well developed. Complaints of poor seed were frequent; but it is possible that some of the disappointment was due rather to weather conditions than to lack of quality in the seed. Late spring frosts did some injury, and early frosts in autumn reduced very much the weight of ensilage corn per acre. The Ontario returns sum up the crop as follows :—'Corn for the silo is described by some as being of inferior quality, while many others claim that it will be good or of fair quality. Taken altogether, however, it has been a decidedly poor year for corn.' In the Maritime Provinces and Quebec some injury was done by cutworms, necessitating replanting and a consequent retarding of the crop, so that it was caught by frost in the autumn. The drought which prevailed from the Temiscouata district in Quebec to the sea coast reduced enormously hay crops, which up till the first of June were apparently in a flourishing condition. Writing of the climatic conditions in Prince Edward Island, the Rev. Father Burke says :—'The season opened with much promise, and there was more soil moisture than we have had for several years. The weather was warm and genial, and the opportunity for getting the crop in was unexcelled. Towards the end of June, however, the complete absence of rain began to be felt, and, as almost every day we had high winds from the south-west, growing crops became a greater concern to farmers. We had merely a few insignificant showers till away on to the last of September, so that grass and all forage crops were seriously affected. Hay was not half a crop, and grain in land not particularly rich in humus very poor indeed. We are exceedingly short of fodder, and the government is importing hay from Quebec to prevent the wholesale slaughter of cattle.'

A much brighter report comes from British Columbia, notwithstanding that large areas were affected by drought. Mr. J. R. Anderson reports grasses and clovers as giving 'good yields throughout the province, and on account of favourable weather hay was mostly well cured. Red clover, alfalfa, sainfoin and alsike in different localities gave some surprisingly large yields on irrigated lands, as much as three crops being cut in places. Timothy is largely grown, but its production is discouraged, as other grasses are preferable for pasture.'

Insect enemies of these crops were not complained of to any large extent; but this cannot be taken to mean that no injury was done. Enormous losses may be sustained in hay and fodder crops without farmers noticing the fact. Then, again, some losses have become so much a matter of every year occurrence that no mention is made of them in reports. This is particularly the case with the CLOVER-SEED MIDGE, to which I

have drawn attention very frequently. The annual loss at the present time is enormous, and yet, if those who grow clover seed practise the simple remedy of feeding off or mowing the first crop before June 20, the results are always so satisfactory that I cannot understand why the practice is not more generally adopted.

Mr. G. H. Clark, Chief of the Seed Division of the Department of Agriculture, who has exceptional opportunities of learning the condition of crops throughout the country, writes to me as follows:—

'Ottawa, Nov. 30.—Referring to your inquiry about the condition of the clover seed crop for 1904, I have to say that our instructor in seed-growing for the province of Ontario has reported that, on account of the severe winter, the crops of alsike and red clover in June and later months appeared patchy, and, in consequence, a much smaller area was left for seed crop than in previous years. Mr. Newman also inspected fields of red clover that had been left for seed in nearly all of the districts where red clover seed is extensively grown, and found in practically every county that the crops had been badly injured by the midge. These conditions, together with the unfavourable weather for ripening the seed, would indicate that the clover seed crop of 1904 will fall considerably below the average.'

Further efforts will be made next season to draw the attention of the clover seed growers to this important matter; and it is to be hoped that a reduction may be made in the great amount of loss which is now taking place every year. Letters appeared in the newspapers last year at the end of June, advising the best steps to take and a few farmers followed them; but the result of the clover seed harvest of this year is very unsatisfactory. The plants in many places suffered from the severity of last winter, and there was a great deal of winter-killed clover in spring. Alsike seems to have suffered even more than red and mammoth clovers, and red clover in all parts of the province of Ontario was injured by the midge. In travelling over part of New Brunswick and in the Annapolis valley of Nova Scotia in June last, I found red clover in almost every section badly attacked by the midge.

The Corn Worm (*Heliothis armiger*, Hbn.).—From time to time complaints are received from various parts of the country of more or less injury to sweet corn in autumn by the caterpillar of a noctuid moth, which is known by various popular names. It is what Professor Lugger called the Sweet Corn Moth, or Tassel Worm, in Minnesota, and is also the same as the notorious southern 'Boll Worm' of the cotton, to which crop it frequently does great damage and for which it has been found very difficult to find a practical remedy. The name of widest use is the Corn Worm, although its injuries in Canada are not confined to Indian corn, for the caterpillars have also been found boring into the fruit of tomatoes and attacking many other plants. There is but one brood in the year in Canada, the caterpillars occurring in autumn and the moths from these emerging the following summer. The worst injury by this insect in Canadian crops is to the cobs of sweet corn, because the work of the caterpillars renders the ears unsightly and discoloured so as to be unfit for the table.

In 1898 there was a bad attack at Orillia, Ont., when as much as 95 per cent of the ears of both sweet corn and yellow field corn were injured. There were other outbreaks in the same year in western Ontario and at Ottawa. These caterpillars do not appear till late in the season, generally during the months of September and October, when they may be found of all sizes, eating the young grains near the tips of the ears, frequently as many as five or six caterpillars working in the same ear. As they approach full growth, when they are an inch and a half in length, they frequently eat their way out of one ear and attack another one.

The only account of injury by the Corn Worm this year comes from Nova Scotia, and is the first record I have had of injury by it in that province.

'Mahone Bay, Sept. 7.—I send you under separate cover specimens of what is to us a new pest. It affects garden corn in the way you will see by the portions of seve-

ral ears I am also sending. There are from one to three of the caterpillars in each ear, and, of about 45 ears picked by me, so far only five were free from them. This pest seems quite general here, and at least for eight or ten miles around. One man only, of all I have asked about it, tells me that his corn is not affected. After a while the caterpillars make a round hole through the husk and disappear, I suppose, into the ground, although I have vainly hunted for them in the ground about the corn roots.' —CHARLES A. HAMILTON.

The caterpillar is somewhat variable in colour, and is from one and a quarter to one and a half inches in length when full grown. The head is honey yellow, and the body varies in colour from pale greenish to dark brown, and is marked with longitudinal dark stripes and with a conspicuous band along the sides where the breathing pores are situated. This band is white, mottled with pink. On the body are the ordinary tubercles which are found on noctuid larvæ. These are distinct and black, each one bearing a slender bristle. The upper surface is marbled irregularly with white, and the whole surface of the skin has a velvety appearance, owing to numberless very short bristles, which are black and white in about equal numbers. A single specimen, which turned out to be a caterpillar of this moth, was found in a greenhouse late in the year (October 28). It was full grown and buried in the ground on October 31. The jar containing it was kept out of doors for the winter, and the moth emerged on July 8 the following year. This caterpillar was remarkably unlike those occurring on corn the same year, being entirely dark velvety green, without conspicuous markings, and was feeding on the leaves of a scarlet geranium. This moth, however, is by no means a common species in Canada, and nearly all of the specimens I have seen have been taken late in the year. Prof. Lugger states that the insect does not winter in Minnesota, but that all are killed late in the fall. This, he points out, would mean that the insect has to be reintroduced every summer from the south, where it can successfully hibernate. Whether the insect also hibernates as a moth in Canada, I have been unable to decide, but it certainly passes the winter in some instances as a pupa, although the caterpillars vary so much in size late in the year that many of them must be caught by early frost, which destroys their food plant. The moth of this insect is somewhat variable in the intensity of colour, but is usually of a dull pale ochreous yellow, with olive or ruddy markings on the forewings. The yellowish hind wings have a broad blackish band, and are edged with pink. These moths expand a little more than an inch and a half from tip to tip of the opened wings.

The caterpillars of the Corn Worm are recorded as having been found on a great many different kinds of plants, including the following crops: Pumpkins, tobacco, beans and peas; and the full grown caterpillars seem to have a penchant for eating into any solid firm object, such as a fruit or pod of any kind.

Remedies.—Unfortunately this is a very difficult insect to keep in check. When it attacks corn, as described above, it is seldom noticed until a considerable amount of harm has been done. Where the caterpillars are troublesome regularly every year, growers, it is claimed, get into the way of recognizing at a glance, ears which are infested, by the discoloration of the silk earlier than is natural in perfect ears. As soon as an infested ear is discovered, the leaves of the husk are pulled back and the caterpillars destroyed by hand. Where, as in Canada, it is only at long intervals that harm is done in any one place, corn growers are taken by surprise, and the injury is done before it is noticed. It is claimed that many of the moths may be taken in lantern traps consisting of a lamp standing in an open pan containing water with a little coal oil on the top of it. Anyone, therefore, who knew the appearance of the insect, upon recognizing the moths in years of great abundance flying around lights at night, might place lantern traps as described above in his crop, and thus prevent future loss; but this insect, like many others which appear in an intermittent manner, will always be a source of trouble. On fields where a crop of corn is known to have been attacked by the Corn Worm, the old stems should be removed from the field as

soon as the crop is gathered, and the land ploughed deeply in autumn so as to break up the cocoons and expose the pupæ to the weather and their various enemies among the small birds and mammals.

The Black Army Worm *(Noctua fennica,* Tausch.).—This cutworm was found in small numbers at Ottawa, chiefly in gardens and clover fields, but no great harm was done. There was a serious occurrence of the insect at St. Emile de Suffolk, Que. Mr. Elsimère Guérin wrote on May 27 : 'This spring I sowed 13 bushels of peas, which have been destroyed by the caterpillars of which I send you specimens. They are beginning to attack my oats. Can you tell me what I can sow in place of the peas without loss ? Also, if there is anything I can use to destroy the worms ?'

The samples sent were full grown specimens of the Black Army worm, which is a velvety black caterpillar with red head and legs and is striped down the back and sides with distinct but fine white lines. The dorsal area is sometimes more or less washed with a reddish tinge. There is a distinct white waved stigmatal band, washed with yellow and bearing in the centre an irregular black line. The lower side of the body of these caterpillars is a dusky green mottled with white. They become full grown about the end of May, when they burrow into the ground and turn to chrysalids, from which the moths emerge in July. In reply to Mr. Guérin's question, he was advised to leave the pea field and see if the plants did not recover, this having been our experience at Ottawa in 1891, when from a field similarly injured a heavy crop of peas was harvested. Later in the year Mr. Guérin wrote to me that he had reaped a heavy crop of peas from this field.

The Cottony Grass Scale *(Eriopeltis festucæ,* Fonsc.).—In the report of the Entomologist and Botanist for 1895, some account is given of a curious scale insect which has occasionally appeared in vast numbers in pastures and meadows in Nova Scotia and Prince Edward Island. From time to time specimens of the egg-sacks of this scale insect on grass (Plate I., fig. 4) are sent in for information, and apparently the species is not uncommon in the Maritime Provinces. During the past summer I observed small colonies in many places, and Mr. W. H. Harrington tells me that he also found them very abundant near Sydney, C.B. Mr. Charles Myers sent specimens from Lake Verd, P.E.I., with the statement that in many places, both in new meadows and on old sod, almost every blade of grass had one or more of the scales upon it.

This insect passes the winter in the egg condition beneath the scales. The young hatch in spring and feed on the leaves and stems of grass. The females become full grown in July, and towards the end of the month lay their eggs in conspicuous elongated oval sacks of closely felted downy white threads. As the eggs pass the winter upon the old grass, the burning over of pastures and meadows late in autumn or before growth begins in spring, would be an easy way of destroying this scale, should it at any time multiply so as to become injurious.

ROOTS AND VEGETABLES.

Both field and garden roots and vegetables have been to some extent affected by weather conditions in spring, and also have suffered considerably from well known enemies, but in most places they picked up well in autumn. Foremost among insect enemies were cutworms, which were extremely abundant and destructive in some parts of the Maritime Provinces, Ontario and the North-west Territories, and also in some places in British Columbia. The Turnip Flea-beetle did a great deal of harm in Nova Scotia, making it necessary sometimes to sow twice and even three times. Turnips

in fields as well as in gardens were much injured by the ordinary Cabbage Root Maggot. The Onion Maggot was destructive everywhere. Beets and mangels had their leaves somewhat blistered by the mining larvæ of the fly *Pegomyia bicolor*, Wied., reports being received both from western Ontario and Nova Scotia; little harm, however, was done, as the attack stopped early in the season. The Turnip Aphis, Cabbage Aphis and plant-lice upon several other vegetable crops were numerous and destructive.

Potatoes were in most districts a satisfactory crop. The Colorado Potato Beetle was less aggressive than for many years, and no new enemies of prime importance were reported. The Potato Aphis occurred at Mahone Bay, in Nova Scotia, and did some harm; but this is an insect which so far has only appeared at long intervals. The Potato Rot has been rather prevalent and destructive. In Prince Edward Island 'the root crops were good—potatoes never better nor less attacked by pests of any kind.' (Rev. A. E. Burke.) At the Provincial Exhibition held at Charlottetown in September last, the exhibit of potatoes was simply wonderful, the tubers being even in size and remarkably free of blemish. In Nova Scotia the crop was a good average one, with little mention of rot. In Ontario there was a large yield, but considerable rot appeared, especially on heavy soil or on low land; the extent of the loss is variously estimated at from 20 to 50 per cent. In British Columbia, Mr. J. R. Anderson says: 'Potatoes are decidedly under the average in those sections where the best qualities are produced; fair on low lands; prices firm. The yield of other root crops is about normal, but short in some of the higher regions, although the quality is good.'

Spraying potato fields with Bordeaux mixture to prevent injury by the Potato Rot has again shown the great value of this useful remedy. Four sprayings on August 1, 15, 31 and September 14, gave potatoes absolutely free of all traces of disease. This was on light sandy land, and, as a rule, one or two more sprayings would be advisable. The saving from this treatment for Potato Rot is now so well established and so many object lessons have been given at fall exhibitions and on the experimental farms, that it is a most remarkable thing that more farmers and others do not practise such a simple method of saving a large proportion of their crop. Although, as with every other remedy, there is a variation in the amount of protection, in every instance that has come under my notice, and these have been many since we began to spray potatoes on the experimental farms, to show farmers what an excellent remedy it is—it has been invariably shown that spraying potatoes with the Bordeaux mixture to prevent Potato Rot always pays. Every year such demonstration plots have been grown since 1891, and, besides this, the Horticulturist and Agriculturist now spray all their potatoes as an economic method of obtaining as big a crop as possible.

The Potato Scab, another fungous disease which frequently disfigures and lowers the market value of potatoes very much, was also reduced to a minimum by soaking the tubers used for seed, before sowing, in a solution of 8 ounces of commercial formalin and 15 gallons of water.

Cutworms.—The larvæ of several species of noctuid moths known collectively under the name of cutworms (Plate I., fig. 1), as usual, did a large amount of harm in gardens, as well as, in some instances, in fields. By far the greater part of the injury was done by the Red-backed Cutworm (*Paragrotis ochrogaster*, Gn.), which is one of the widest spread and most injurious cutworms we have in Canada, appearing every year in greater or lesser abundance. It is not always possible to determine the species which is reported upon, but in most instances mentioned below actual specimens were received:

I was informed when in Prince Edward Island recently that, in almost all parts of the Island, cutworms had been most destructive last spring. Father Burke says: 'They were never more plentiful than last year and did a great deal of damage to all crops. Your poison bran remedy seems dangerous to apply where there are birds, fowls and other domestic animals about.'

Mr. A. McNeill, Chief of the Fruit Division, Department of Agriculture, writes on July 27: 'During my last visit to Prince Edward Island, I saw in many places, particularly in Queen's County, most serious depredations by cutworms. Our July crop reports emphasize this and show that the root crops as well as garden truck have been almost completely destroyed by cutworms. I trust you will be able to think out some scheme to help farmers get rid of this enemy.'

Mr. Saxby Blair, Horticulturist at the Experimental Farm, Nappan, N.S., told me, when visiting the farm in June last, that this same cutworm had done a great deal of damage in his vegetable plots and in the flower beds. I advised him to use the poisoned bran remedy, and he now tells me that, as far as the cutworms are concerned, this was most satisfactory in checking them.

'Mahone Bay, N.S., June 28.—I send specimens of cutworms which are doing damage here. They cut off indiscriminately all kinds of vegetables. One of the specimens sent had just finished cutting off a potato stalk nearly half an inch in diameter. About ten per cent of my peas were taken, and other vegetables were injured. Some of my neighbours suffered somewhat more severely. These grubs, I notice, are becoming more common. Last year there were comparatively few, and the year before I saw none. Please tell me the species. I don't need other information as I find cutworms fully treated in your reports.'—C. A. Hamilton.

'Tignish, N.S., June 30.—Cutworms are doing much damage in this part of Cumberland County. In my garden, with the exception of potatoes and sweet corn, they have eaten nearly everything.'—G. E. Stopford.

'Northport, N.S., July 6.—The cutworms I am sending are destroying cabbages, mangels, beans, &c., and are a perfect pest. What can be done to prevent their still growing more plentiful another year and to put a stop to the damage they are doing now ?'—G. Brander.

'Forest Glen, N.B., July 1.—I send you specimens of grubs which have given us great trouble this spring in our garden. They eat off the bean stalks just as they come above the ground. After they had destroyed a great many of our early beans they attacked black currant and gooseberry bushes.'—J. Bleakney.

'Hartland, N.B., July 4.—I am very much troubled this year with insect pests. Many of my plants are being cut off by grubs, and the trouble is general in this neighbourhood. In my garden, only cauliflowers and cabbages are attacked; but, with my neighbours, beans and tomatoes are badly destroyed. One man lost half his beans. I see that you recommend mixing bran with Paris green and sweetened water, putting a little of this round the plants. Is there any possibility of the plants absorbing enough of the Paris green so placed to render them unsafe for food ?'—John Barnett.

'Batiscan Station, Que., July 8.—What can I do to destroy grubs that are eating up my onions, cabbages and other vegetables ?'—M. Sissons.

'Trenton, Ont., November 11.—The only instance of serious loss from insect enemies during the past season, which has come under my notice, was when I was at Coe Hill about midsummer. I learned of the almost total destruction of young cabbage plants early in the season by cutworms.'—John D. Evans.

'Calgary, Alta., June 20.—We are sending herewith some cutworms which are destroying all plants they come in contact with.'—Hole & Anderson.

'Blackfalds, Alta., July 8.—Cutworms are very bad here this year. They have even started to eat off stalks of the potatoes.'—E. Dalton Tipping.

At Ottawa there was again this year a veritable plague of cutworms. My assistant, Mr. Arthur Gibson, took notes upon some fields which had been treated to save the crops from cutworms; and his observations confirmed us in the belief that the poisoned bran remedy, which I have advised so widely during the last few years, was on the whole the most satisfactory way of stopping injury by cutworms, and is a practical remedy equally applicable for crops growing in fields as in gardens. Mr. Gibson found in a field of tobacco which was being rapidly destroyed, that, by the second day after the remedy was applied, the destruction of the plants stopped entirely, and dead

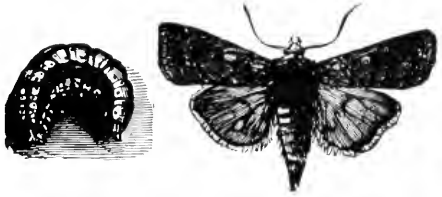


Fig. 1.—A cutworm and its moth.

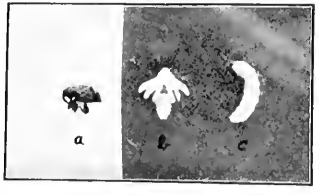


Fig. 2.—The Plum Curculio: *a*, beetle; *b*, pupa; *c*, larva—natural size.

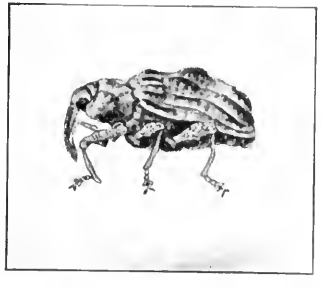


Fig. 3.—The Plum Curculio: beetle—enlarged.

Fig. 4. The Cottony Grass Scale: egg-sacks on grass—natural size.

(Figs. 2 and 3 kindly lent by J. M. Stedman, Columbia, Mo.; Fig. 4, by the N.H. Agr. Exp. Station.)

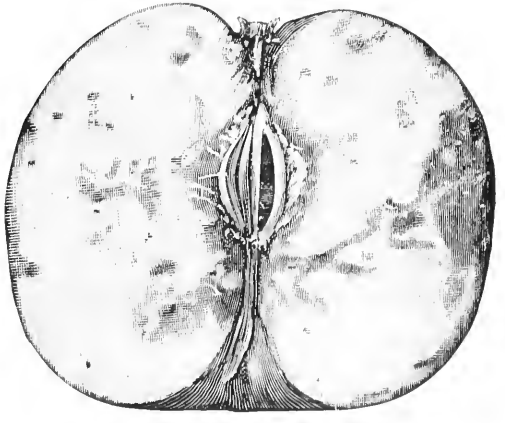


Fig. 5.—Apple infested by Apple Maggot.

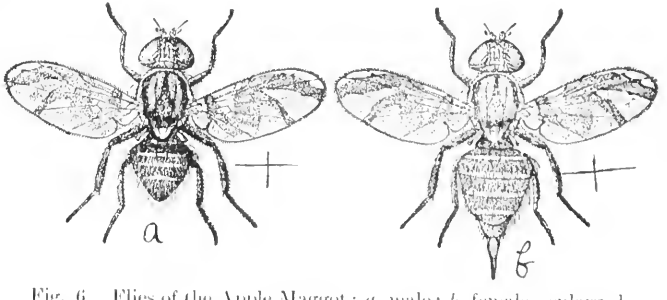


Fig. 6. Flies of the Apple Maggot: *a*, male; *b*, female—enlarged.

or dying cutworms could be found by moving the soil lightly beneath every plant. By actual count, as many as nineteen were found under a single plant, and nearly as many under several others. This is only one instance of the very remarkable effectiveness of this remedy.

Remedy.—The poisoned bran mash is made by mixing half a pound of Paris green with fifty pounds of slightly moistened bran. In making this, it is best first to dampen some of the bran slightly with water containing a little sugar. After mixing thoroughly, add the Paris green by dusting it on the surface and stirring all the time. We have found that when Paris green is added to perfectly dry bran, owing to its weight, it will sink at once to the bottom when stirred, in the same way that it does in water. Half a pound of Paris green is enough to poison fifty pounds of bran, although double this amount may be used. If the mixture is too wet, more dry bran should be stirred in until the mixture will crumble easily and run through the fingers without adhering.

When required for garden use, all that is necessary is to sprinkle a little of the poisoned mixture by hand around such plants as are liable to attack. When crops are planted in drills or in rows, a convenient way is to make the mixture almost dry and then distribute it by means of a Planet Junior or other wheel seeder. In field practice, among such close growing crops as standing grain, which are sometimes injured by the Red-backed Cutworm, the poisoned bran remedy is also serviceable. The mixture can be distributed by means of a paddle or shingle and can be thrown easily to a distance of twenty feet. When distributed in this way, there is much less danger of chickens and birds picking it up than if it is placed in lumps.

The question of danger from the use of this poisoned bait is one which must be considered. It is frequently inquired about by correspondents, and some instances of the poisoning of poultry where it has been used, seemed to be justly attributable to their having eaten some of it. As a rule, there is little danger from this cause. The quantity used is so small that it is not noticed by poultry; and then, in gardens, poultry do so much harm to plants that they should never be admitted, at the time of year when cutworms occur injuriously and only at special times of the year when there are no crops to injure. If, however, there should be a bad infestation by cutworms and there is no means of barring out or driving away the chickens, the owner of the crops must decide whether he will lose his crop or take special means of protecting his chickens. The experience of a great many people who have used this remedy without taking any special precautions, is that injury to domestic animals is extremely rare; and, although I have been on the watch for any trouble of this sort for many years, I do not know of a single instance when poultry have been poisoned, without doubt by eating poisoned bran put out for cutworms. However, there will be many occasions when plants in gardens may be protected by putting out the poisoned bran in small heaps and then covering these up with a piece of shingle or some other covering, so that the material cannot be got at by stray chickens and other poultry.

It has also been asked whether there is any danger of plants absorbing Paris green from this mixture when placed near their roots. In reply to this, it is only necessary to point out that Paris green is practically insoluble and therefore cannot be absorbed by the plant.

Root Maggots.—These insects, which every year are a serious tax on market gardeners, were in 1904 particularly aggressive, and from every province frequent demands were made for a practical remedy. Radishes, cauliflowers, cabbages, turnips, onions, and, in a few instances, beans and sweet corn were injured. Only a few years ago there were many districts in the West where root maggots were unknown; but of late years these have been invaded. Bad infestations are reported by Mr. N. H. Holland, from Norquay, Man., who speaks of his success in growing onions in former years, but now finds that he has this year lost a third of his crop and says that the maggots are get-

ting worse every year. Loss is also reported from Regina, Moosejaw and Calgary, as well as from many places at the coast, in British Columbia. In the Ottawa district these maggots were particularly destructive, and on the Central Experimental Farm Onion Maggots worked actively throughout the season from the middle of June till November, when they were destroying the ripe bulbs. The Radish Maggot was abundant in spring, and again in September. Cabbages and cauliflowers which were kept free from these enemies till the middle of July, were not afterwards injured. This was probably due to the hardening of the stems and the abundant root growth. Beans planted late and too deep in the soil were moderately attacked, but this is an unusual injury. Only one instance of corn being injured came to my notice, and this was from the seed having lain in the land for a long time and growth being retarded by cold wet weather. Several remedies were experimented with, but no very satisfactory results were obtained, except in the case of plants grown under a light wooden frame covered with cheese cloth, such as was mentioned in my last report. Under these protections, however, radishes and cauliflowers of high quality were grown which were perfectly free from the attacks of the maggot. Onions were too much drawn up by the shade and did not bulb well. I found that a convenient covering of this nature 8 feet long by 2 feet wide, and 2 feet high, can be made for about 25 cents, the frame being of light one-and-a-half-inch square wood simply nailed together at the corners and with cheese cloth tacked on on the outside. In a frame of these dimensions five cauliflowers and two rows of radishes were grown. The frame was kept on from the time the seeds were sown until the radishes were pulled. Cauliflowers were sufficiently advanced to require no further protection, and the frames were removed about the 1st of August. As a rule, the attack of the root maggots becomes perceptibly less by the first of August; and even late cabbages planted in July are seldom attacked by root maggots. During the season of 1904, the insect in all stages could be found throughout the season.

For plants grown in the open, the best results this year were secured from the following remedies:—

For Onions.—White hellebore dusted along the rows once a week gave comparatively clean onions, very few being attacked. In years when it is necessary to apply the remedy throughout the season, this would be too expensive to be considered a practical remedy. The Cook carbolic wash, which is very effective for radishes, was less so with onions. Pyrethrum insect powder, Bug Death, Paris green and plaster, used as dry powders, had little effect. Sand saturated with coal oil and Jeyes' Gardeners' Friend, were also tried this year without any decided results in saving onions from attack.

For Cabbages.—The remedies which have given the best results for cabbages are: 1. The Goff tar paper disks, which are pieces of ordinary tarred building paper three inches in diameter, with a slit running to the centre so as to allow of their being placed around the stems of the young cabbages at the time of planting. 2. About half a teacupful of a decoction of pyrethrum insect powder, four ounces to a gallon of water, poured around the roots of each plant after drawing away the earth, right down to the rootlets. The earth should then be pushed back again and hilled up round the stem. As a substitute for pyrethrum insect powder, hellebore was tried this year, not only at the Central Experimental Farm, but also by Mr. Saxby Blair, the Horticulturist at the Experimental Farm for the Maritime Provinces, at Nappan, N.S.. The results were very satisfactory. Mr. Blair writes : 'The Cabbage Root Maggot gave us considerable trouble last year; but this season their numbers were much greater and they proved very destructive to all the plots of cabbages and cauliflowers except two. These were where hellebore was used. This remedy exceeded all my expectations, and no root maggots could be seen around any of the plants in these two plots; indeed, they were the only good cabbages out of some 1,500 set out. The powder was mixed with water and applied with a force pump; I used two ounces to the gallon and four ounces to the gallon, and found the results of the two ounces just as good as where

four were used. I am much pleased with this remedy, and, as far as one can judge from a single season, I am inclined to consider this a positive remedy for the root maggot of cabbages.'

Hellebore as a remedy for root magots was first recommended to me many years ago, about 1888, by Mr. S. Greenfield, a successful gardener of Ottawa East; and I have found that, as a rule, it is a useful remedy. At Ottawa this year, as in previous years of heavy infestation, it provided considerable protection, but was not as perfect a remedy as Mr. Blair found it at Nappan.

For Radishes.—The Cook carbolic wash, consisting of one quart of soft soap, or one pound of hard soap, in a gallon of water, with half a pint of crude carbolic acid added, and the whole boiled together for a few minutes, to make the stock emulsion, has proved over and over again an excellent remedy for radish maggots. The stock emulsion can be kept in a closed vessel, so that dust and rubbish will not fall into it; and, when required for use, one part of this mixture by measure is added to fifty of water, and should be sprayed directly upon the growing plants from the time they appear above the ground, once a week until ready for the table. Applications of nitrate of soda, kainit and potash whale-oil soap, all of which have been from time to time recommended, proved to be quite useless at Ottawa.

It must still be acknowledged that up to the present time we have not secured a practical remedy for root maggots on onions. For radishes, which are ready to pull from five to six weeks from the time the seed is sown, the question of protecting them is much simpler than in the case of onions, which are growing throughout the season. The maggots of the first brood are nearly full grown and very destructive about the end of June ; and, in some years, if the plants can be protected from injury up to that time, they are as a rule safe for the rest of the season.

There are some features about this attack which make it of interest to the entomologist. Some experiments have seemed to indicate the great value of a certain remedy, and then under other conditions this same remedy has proved comparatively useless.

For next year extensive experiments have been planned, and special attention will be given to this matter, which is one of great importance, both to the professional and amateur gardener from one end of the country to the other. From the limited experience we have had with the cheese-cloth coverings, I have no hesitation in recommending these to amateur gardeners, however small their gardens may be, as a sure means of obtaining perfectly clean, as well as early, radishes and cauliflowers of the very best quality, at a comparatively light expense.

The Green Blister Beetle (*Cantharis cyanipennis*, Say).—Several kinds of blister beetles occasionally attack cultivated crops, and, unless driven off or poisoned, do much harm in an incredibly short time. Although in the larval state they are predaceous parasites feeding on the eggs of locusts, in the perfect condition they feed voraciously on vegetation. The Green Blister Beetle has not been previously sent in as a crop pest, but on June 15 last Mr. Richard Coates wrote from Cowley, Alta.:—'Enclosed you will find some insects which have come in numbers to my garden this year. They stay right with the beans and peas and soon destroy them.'

These beetles are long narrow insects, sometimes nearly an inch in length, of a most beautiful deep blue-green colour, which alight in large numbers and then may be noticed crawling quickly over the plants they are attacking and rapidly devouring the foliage. I have collected this species on the wild American vetch, at several places in western Assiniboia and southern Alberta.

Cabbage and Turnip Aphis (*Aphis brassicæ*, L.).—Reports of injury by this plant-louse have again this year been received from many and very distant localities. On the whole, however, I do not think it has been quite as destructive as usual.

'Victoria, B.C., November 1.—Aphides of various kinds were in evidence. Swedish turnips and cabbages suffered severely from their ravages.'—J. R. ANDERSON.

'Cowley, Alta., October 19.—My vegetable garden is covered this year with a grayish-green insect, something like the green fly that attacks house plants. They began on the turnip tops, but now the Brussels sprouts are so covered that I cannot use them, and I can only use the large heads of cabbage which are too firm for them to get inside the leaves. Most of the cauliflowers were unfit for use from the same cause.'—F. W. GODSAL.

'Depot Harbor, Ont., September 12.—I send you samples of insects which are destroying my turnips and cabbages. What are they and what is the cure?'—J. F. PRATT.

Other Ontario occurrences which came to my notice were of fields moderately infested at Whitby and at Ottawa. There were a few reports from Quebec and from Prince Edward Island, and one from Mahone Bay, N.S.

The remedies are to watch for the beginning of the infestation when hoeing turnips and cabbages, and destroy the colonies either by spraying with kerosene emulsion or whale-oil soap, and the destruction or deep ploughing down of all turnip tops or refuse of cabbage beds in autumn, so as to destroy the eggs.

Although parasites are generally present in considerable numbers, they have not, as a rule, controlled this species so completely as is the case with many others. On the Ottawa fields, specimens of a parasite were present, which has been kindly identified by Dr. Ashmead, through Dr. Howard, as *Lipolexis (Aphidius) rapæ,* Curtis. Dr. Howard says:—'This is a European species evidently introduced. We have it also from Michigan.'

PLANT-LICE of various kinds were complained of on many kinds of vegetables and root crops during the past season. Dr. C. A. Hamilton, of Mahone Bay, N.S., has favoured me with some interesting notes which he has made from time to time in his locality during the past summer.

POTATO APHIS (*Nectarophora solanifolii,* Ashm.).—Potatoes are not often troubled with plant-lice in Canada; but at long intervals outbreaks have been observed on this crop, and such a one occurred last summer at Mahone Bay, which was closely watched by Dr. Hamilton.

'Mahone Bay, June 28.—I send you some aphides from potatoes. These are apparently the same species as is now on my salsify and are abundant enough to have appreciably blighted my potato plants.'

'July 10.—There seem to be aphides on almost everything this summer, probably because of the abnormally dry season. Besides those sent, I noticed them to-day on squashes, cucumbers, broad beans, turnips, cabbages, beets and carrots, in fact, on almost everything I looked at.'

'July 14.—The aphis on my potatoes has overrun the whole patch, with the result that the potatoes have stopped growing and look very unhealthy. The blossoms have withered up and fallen, the lower leaves have turned yellow, and many others have turned black, just as if smitten with the blight, and are falling. They occur in immense numbers. Their favourite position is upon the peduncles of the flowers, which they cover completely. They are also found in large clusters on the stems and upon the under surface of the leaves. In many colonies there are a few flesh-coloured individuals.

'July 15.—In *re* potato aphis, I to-day examined several plots near the village and found one field with about half the plants which had blossoms fairly well covered with aphis; other plants also had a few.

'July 16.—The plant-lice on the potatoes are fast diminishing in numbers; but they have left the crop in a sorry condition.'

'August 1.—I send you to-day a last specimen from my potato plot. They have evidently been killed by a fungus. I first noticed its effects about a week ago on one

corner, and it has since spread over the whole piece. Very few aphides are left alive. Since I last wrote, I noticed larvæ of lady-bird beetles and of *Syrphus* flies; but neither of these nor anything else had much effect in reducing the numbers of the plant-lice until this disease appeared. A month ago my potatoes could not have looked more promising. To-day I tried them, and out of six average hills I got 17 tubers, of which two only were large enough to be marketed.'—C. A. HAMILTON.

Remedy.—Should this plant-louse again appear in large numbers, infested plants may be freed of them by spraying either with whale-oil soap solution, one pound to six gallons of water, or kerosene emulsion, one to nine. These remedies would also be effective against the Colorado Potato Beetle, the Four-lined Plant Bug, Leaf-hoppers, and probably all other insect pests likely to be found on potatoes. They would not, however, probably be of any use against the Potato Rot fungus for which the Bordeaux mixture is such a useful remedy.

Aphis on celery, carrots and parsnips (*Siphocoryne*, sp.).—Dr. Hamilton sent also some aphides which he had found on celery, carrots and parsnips. It is probable that there were only two species concerned, and that both of these occurred on celery. Plant-lice are very difficult insects to send alive by mail, and, when put in alcohol or other preservative fluids, they lose their colour so much that they are not very suitable for study unless the species is well known. I am sorry to say that, notwithstanding much trouble taken by Dr. Hamilton in sending them, the specimens did not arrive in very good condition. They were, however, referred to Dr. Howard, Chief of the United States Bureau of Entomology, who reports under date July 17: 'Mr. Pergande has examined your aphides and says that 1 and 2 are species of *Siphocoryne*, apparently undescribed. The specimens on potato and salsify were rotten, but they appear to be *Nectarophora solanifolii*.'* The two species of *Siphocoryne* referred to above were very different in appearance, and there seems to be little doubt that they are different species. The specific description of these, however, will have to be postponed until further material is available. I shall be obliged to any of my correspondents who may at any time find plant-lice on carrots, parsnips or celery, if they will forward them to me for study.

Injury to celery and parsnips by plant-lice I have never seen before; but the attack on carrots has come to my notice on two or three occasions previously, and has been one of considerable importance.

'Mahone Bay, June 28.—I send aphides from my celery, some have wings and some are without; but, as I always find them together, I take them to be the same species. The small wingless ones are extremely active, disappearing at a touch to the plant. This is the first time I have seen plant-lice on celery in the three years I have been raising that crop. Eight or ten days after I set out the young plants I found them swarming with these insects, and my neighbour's plants are the same. What I think are the same kind of plant-louse, I find also on near-by weeds, *Chenopodium album* and *Galeopsis tetrahit*. I had some carbolic acid and soap wash made up for root maggots. I gave them two sprayings with this and it cleared them out.'

'July 8.—I send a number of aphides with a few celery leaves, which I hope will reach you alive or at least in good condition for examination. It is very difficult to capture these, but by touching the plants with a piece of cotton batting they jump into it and become entangled. The specimens you ask for are in bottle No. 1. Bottle No. 2 contains another kind, I suppose, which are found rather sparsely on the under-side of the leaf. In one of my letters I said that I thought that these insects had been brought here from Halifax on plants obtained by a neighbour. I do not think this now, as I find them infesting the celery of another neighbour who raised his plants from seed and who lives over half a mile from either of us. When first noticed, the insects were very plentiful, the celery was only an inch or an inch and a half high,

*Dr. Ashmead's description of this aphis is to be found in 'Canadian Entomologist', vol. XIV., 1882, p. 92

but each leaflet bore from six to ten aphides. They were scattered promiscuously over the plant, not clustered in any way. I sprayed my celery three times at intervals of a few days with the carbolic wash mentioned on page 182 of your 1903 report, with the result that the insects disappeared entirely each time for a day or two, then reappeared, but in diminished numbers. Close observation to-day shows me that these plant-lice are on the celery bed, on the soil and plants of an adjacent salsify bed, one foot away, as well as a few upon beds of carrots; and they appear to be feeding on both of these latter plants. I cannot see that they have injured my celery very much, whatever they might have done, had they been left unchecked; still, they undoubtedly are feeding upon it, and perhaps the injury does not show, because the ground is very rich and the plants are well cared for. No. 2, however, whenever present, distorts the leaves, and, if present in larger numbers, would, I think, be very injurious.'

'July 10.—Aphides from Salsify : These are increasing very fast, and my plants are getting overrun, but you will notice that some of them are parasitized, having died and turned white. They are bound down to the leaf with a webby material which covers a small grub.'

'July 14.—Whitish fragments of dead aphides lying in abundance upon my carrot leaves and upon the ground beneath called my attention to them, and I found the new leaves had their petioles swarming with plant-lice. Although very plentiful, they do not yet seem to have done much harm. I find a few species of lady-bird beetles and some other predaceous parasites, of which I send you specimens. I have been more anxious for you to see these insects, because on looking over your reports I find no reference to either a potato or a carrot aphis.'

'July 15.—I find to-day that my parsnips are also infested by aphis. Please notice if these are not the same species as those on carrot; and those on potato look very much to me like those I sent you some time ago, which were found on salsify.'

'July 16.—The dark hopping aphis on celery has disappeared; but I send you more of the green ones from the underside of the leaves, with as many winged specimens as I can find. They have not been very plentiful on the celery, but seem to me very much like those from the carrots and parsnips. I find lady-bird larvæ very plentiful on my carrots to-day, and they are clearing off the aphides nicely. I have been much interested in watching these pests, and shall be obliged if you can send me the names of them : two from celery, one from parsnips, one from carrots, salsify, cabbage and potatoes.'—C. A. Hamilton.

'Antigonish, N.S., Sept. 7.—My celery has been infested by a green bug. I inclose specimens and should like to know what it is and how to get rid of it.'—F. H. Beals.

As stated above, there is still some doubt as to the exact identity of the species found on celery, carrots and parsnips. I shall, therefore, be glad to get specimens for further study.

The Red Turnip Beetle *(Entomoscelis adonidis,* Fab.).—In travelling through Manitoba and the North-west Territories in July last, I saw very few specimens of this beetle, which is sometimes a rather serious pest of cruciferous crops in the West; but some inquiries have been sent in as to its nature and habits.

'Edmonton, August 21.—Some gardens here are infested with a beetle somewhat like a lady-bird but bigger, which is bright red with black bars down its back and a spot on the collar, about three-eighths of an inch long by a quarter of an inch wide. This is doing some harm to radishes and turnips. In addition to this, some of the white turnips are terribly diseased this year.'—C. H. Stuart-Wade.

The same insect was written about from St. Lazare, Man., by Mr. Louis Worms, who says that the insect had appeared in his district, and had been the cause of a good deal of discussion among farmers as to whether or not it was the Colorado Potato Beetle. He speaks of the leaves of turnips being entirely eaten or cut up into rags, and also that a large number of the turnips had rotted.

Mr. Norman Criddle reports that 'The Red Turnip Beetle became rather troublesome last summer to cabbage, radishes, turnips and a few other garden plants. I noticed, too, that it had a preference for radishes in the seedling state. A few of these plants left to go to seed would, I think, make excellent traps for the beetles, and could be sprayed from time to time to destroy those which have gathered there.'

The Purple-backed Cabbage Worm [*Evergestis (Pionea) straminalis*, Hbn.].—Occasional reports have been received at different times during the past ten years of the presence of short bristly caterpillars attacking cabbages and turnips in the Maritime Provinces. This injury was for the most part to turnips, and was generally noticed late in the season, the caterpillars congregating on the crowns of the turnips and eating cavities into the roots, as well as consuming the leaves. During the past season this caterpillar seems again to have been somewhat abundant, particularly on Cape Breton Island, whence Mr. E. J. Williams, of Little Bras d'Or, sent specimens, together with notes on the occurrence. He also reports that in some years whole fields of cabbage and turnips have been destroyed by these caterpillars. Among the specimens sent by Mr. Williams were a large number of half-grown larvæ of the Spotted Cutworm (*Noctua c-nigrum*, L.), which undoubtedly had been responsible for some of the injury described by him in the following note. Writing under date of October 24, he says:—'I am sending you some of the caterpillars I spoke of. They are very gregarious in their habits; they start under the leaves right on the ground but mine their way up to the head, tunnelling it hollow.'

In 1903 Mr. C. H. Young, of Ottawa, made some observations on injuries by this species upon cabbages near Old Chelsea, Quebec, twelve miles from Ottawa. The caterpillars, however, were not very numerous in this instance, and were not noticed to bore into the stems as mentioned above, but lay exposed on the leaves, and only two or three caterpillars were found on a single plant. Full-grown larvæ collected by Mr. Young on July 11 produced moths on August 8.

There is little reference to this species in the literature on injurious insects; but under the name of *Pionea eunusalis*, Walk., there is an account, with a good figure of the larva, by Thaddeus Harris in his Entomological Correspondence, page 322, stating that on October 30 and November 1, 1841, he had found larvæ on the leaves of horseradish. He thus describes the attack: 'They eat large holes out of leaves, leaving finally only the veins untouched. They live beneath the leaves, stretched out by the sides of the midrib. They creep regularly, not haltingly, and move pretty fast. When alarmed or disturbed, they curl quickly and loose their hold and fall to the ground. Found the same on turnip leaves, October 20, 1844. Their ravages were considerable.'

The Purple-backed Cabbage Worm is closely related to the Cabbage Pionea (*Evergestis rimosalis*, Gn.), which is a well known pest of the cabbage and turnip. That species, however, does not occur injuriously in Canada. The following is a description of the caterpillar, and is made from the specimens sent by Mr. Williams:—

Body tapering slightly to each end; length, three-quarters of an inch by one-eighth at the widest part; head, a shield divided into two spots on the second segment, and a small plate at the end of the body, black. The general colour of the back, purple with a brownish tinge, the lower part of the body, pale greenish. The body is marked with the ordinary bristle-bearing tubercles and a rather conspicuous yellow band on each side, where the breathing pores are placed. The six tubercles above the side lines are rather more conspicuous than those below the lines and are of a deeper black. The tubercles are all black, but have white marks at their bases, which form a part of an indistinct network of lines over the whole upper part of the body. These lines are broken up into dots, or seem to be narrow, broken, thread-like longitudinal lines connecting the tubercles in each series. There is also an equally indistinct line which runs transversely across the middle of each segment, and one in each intersegmental fold, the whole forming an open network composed of two series of very indistinct but perceptible lines running at right angles to each other. The chief character by

which this caterpillar will be recognized from that of the Cabbage Pionea, is that its head is shining black, while that of the last named is yellowish.

The moth of the Purple-backed Cabbage Worm is a very neat little species, which expands seven-eighths of an inch. The upper wings are of a strawy yellow with a satiny lustre, and are marked rather distinctly with a heart-shaped discal spot, two distinct transverse waved lines across the centre of the wing, the inner of which runs through the middle of the heart-shaped spot, and two less distinct lines, one at the base and the other close to the apex. There is also a conspicuous dark blotch bearing a white crescent outwardly, towards the apex of the wing. The spaces between the transverse lines, especially on the nervures, are powdered sparsely with brown scales. The lower wings are silvery white, with a clear, broad black margin and a narrow submarginal line inside this. The fringes of the upper wings gray, of secondaries white.

The full life history of this insect is not yet known; but it passes the winter as a chrysalis in a closely woven cocoon, to the outside of which many particles of earth are attached. The moth emerges in the spring, and there are probably two or three broods in the season.

FRUIT CROPS.

The conditions affecting the value of fruit crops in Canada during the past season are peculiar. The apple crop has not been particularly large in most districts, but was of exceptionally good quality. Early apples were abundant, but the markets were poor and 'thousands of bushels of fall apples remained unpicked or were fed to live stock.'—(Ont. Crop Rep., Nov., 1904.) Winter apples were rather short in quantity and, notwithstanding the quality, the present prices are low, owing to the enormous crop of high quality apples in Europe, which discouraged shipments and kept the fruit in our own markets, glutting them and holding down prices. There was an unusually poor plum crop almost everywhere, except in British Columbia, where it is reported 'plums and cherries were up to the average; large quantities were sent to the North-west, and good average returns were realized. Small fruits also gave our growers good returns this year; raspberries were a fair crop, blackberries good, strawberries yielded well, and those shipped to the North-west and Manitoba arrived in excellent condition.'—J. R. ANDERSON.

The excessive cold of last winter seems to have affected somewhat nearly all of our fruit crops this year. Apples are everywhere reported as rather small in size. Many varieties were severely killed back on the young wood. The same thing, and to a greater degree, is reported of pears; and this fruit was also injured by drought in British Columbia, and Black Spot and Fruit Crack in Ontario. Strawberry plants nearly everywhere suffered from winter-killing. The heaviest loss to fruit-growers from the winter was in the great destruction of the peach orchards in western Ontario, and in the orchards of Northern Spys and Baldwins throughout the country. Grapes were a fair crop, but where not sprayed, were considerably injured by Black Rot *(Læstadia Bidwelli,* V. & R.), the Brown Rot *(Peronospora viticola,* De Bary), and mildew.

Injurious insects were fortunately not very aggressive in 1904. There was, of course, as is always the case, a certain amount of damage done by the regularly occurring pests of the orchard, such as Tent Caterpillars, Cankerworms, the Eye-Spotted Bud-moth, the Oyster-shell Scale, the Cherry Slug, the Imported Currant Sawfly, &c., for which standard remedies are available to all who wish to use them. These insects give no trouble in any properly looked after orchard, where the work is done syste-

matically at the proper time and with due regard to the true value of each operation, where regular cultivation and spraying are done as a matter of course, and not as an exceptional expedient which some unusual occurrence has made necessary.

Mr. A. McNeill, Chief of the Fruit Division of the Commissioner of Agriculture's Branch of the Department of Agriculture, has kindly allowed me to examine the reports from his correspondents all over the Dominion; and in this way I have been able to learn many useful facts concerning the condition of fruit crops and the insect and fungous enemies which have affected them during the year. Mr. McNeill writes as follows:—'Our crop reports this year furnished us with a large amount of material bearing upon fungous diseases and insects. On the whole, it may be said that these enemies did not do as much harm as usual. There were, however, several sections where the Apple Scab (Black Spot, *Fusicladium*) was particularly bad. One of these was the western peninsula of Ontario, where it was difficult to secure any clean fruit except in well sprayed orchards. A curious condition prevailed in the Annapolis and Cornwallis valleys of Nova Scotia. One part of the valley was particularly free from fungous diseases, while in another these were decidedly prevalent. There were no serious attacks of insects, and indeed the year 1904 may be said to have been remarkable for the absence of injury by the Codling Moth. This exemption, however, must not be counted on for the future, inasmuch as there were still sufficient insects to propagate the species; and, with favourable conditions, there is no reason why the Codling Moth should not be prevalent again next year.'

Mr. J. R. Anderson writes :—'Victoria, B.C., Nov. 1.—Apples were good, but the yield was only average. Prices ruled high, and those growers who put their product on the market in good shape realized well. Fruit-growing is receiving much greater attention, as it is better realized that, with that care which is due to every branch of agriculture, a very superior article can be produced, with a corresponding profit to the grower. An exhibit sent to England from British Columbia was awarded the highest gold medal of the Royal Horticultural Society. This alone has stimulated the planting of orchards to an unprecedented extent.'

'Wolfville, N.S.—We have been singularly free from injurious insects this year; but Cankerworms and Tent Caterpillars are both on the increase, and there has been some loss from Eye-spotted Bud-mouth and Cigar Case-bearer, the latter of which is especially common in Annapolis County.'—F. C. Sears, *Horticulturist, Department of Agriculture, Nova Scotia.*

'Alberton, P.E.I.—Our apple crop is large and cleaner than for many years, even in unsprayed plantations. The Black Knot on plums and cherries, wild and domestic, was bad.'—Rev. A. E. Burke.

The following occurrences of insects injurious to fruit crops, among others, have been brought to my notice during the season and have received attention from the officers of the Division.

The San José Scale (*Aspidiotus perniciosus*, Cmstk.).—It is satisfactory to be able again to report that no new infestations by this insect have been reported beyond the limits of the area already invaded in 1903. It is probable that during the severe winter of 1903-1904 a large proportion of the wintering scale insects was destroyed. Among reports received, the following is of considerable interest, as coming from one who is specially able to observe and draw correct conclusions. Mr. Geo. E. Fisher, of Freeman, Ont., writes on July 10 last as follows :—

'The past winter was so unusually severe that I have been much interested in examining the condition of the San José Scale, to learn if possible the effect of extreme cold on this insect. Mr. Davis, of this place, for the past two years, has prepared about 100 barrels of lime and sulphur wash each year, which has been used by the fruit-growers in the district with such good effect that there is really little opportunity for investigation. However, I found a spot where the scale had been for some time, and had not been treated. I made weekly visits to this orchard, beginning about the

middle of June. At that time most of the scale insects appeared to be dead, and, as I had found in my experiments, that the males were more easily killed by treating with various mixtures than the females, I hoped that the winter might have destroyed the males, and that there might be no breeding. The cold weather certainly reduced the scale very much indeed, only a small proportion being alive, and these developed slowly; but I find that some have reached maturity, and at the present time trees which last fall had a lot of live scale upon them, have larvæ in moderate quantity running on the twigs, some with new white cover scales just formed, and some which have reached the drab-coloured state. From what I saw in this orchard, I take it that breeding began about July 5 this year, or two weeks later than usual.'

Although the San José Scale has not spread beyond its former limits, there is still a heavy and destructive presence of this insect in the orchards within the infested area. As misstatements with regard to this matter have frequently appeared in newspapers and elsewhere, it may be well to again repeat that the only part of Canada where the San José Scale is found is in the Niagara Peninsula and in the counties along the north shore of the western end of Lake Erie. Every care is being exercised by the Honourable the Minister of Agriculture to prevent any fresh importation from outside countries. The fumigation stations at Vancouver, B.C., Winnipeg, Man., Windsor and Niagara Falls, Ont., St. John's, Que., and St. John, N.B., are kept open in charge of competent men, who unpack, fumigate with hydrocyanic acid gas, and promptly repack and send on, all nursery stock which comes into the country. The fumigation with hydrocyaic acid gas, of the strength and for the time the trees are submitted to it in the government stations, is perfectly certain to kill every scale insect upon them.

A rigorous watch has been kept on every kind of nursery stock which could possibly bring in fresh importations of the San José Scale; and I have again this year the greatest satisfaction in reporting that no single instance has been brought to my notice of living scales having been detected on trees which had passed through the fumigating houses. The superintendents at all of the stations have done their work carefully and well, and no well-founded complaints have been received from importers, either as to the slight delay which must occur while the stock is being treated, or as to any injury to the trees during the necessary unpacking, handling and repacking. Careful experiments have shown that the formula used at our federal fumigation stations is thoroughly effective in killing the San José Scale, and does not in any way injure the stock submitted to the gas. The formula used is one ounce of cyanide of potassium (98 per cent), one ounce of commercial sulphuric acid (66° Baumé), and three ounces of water—exposure, 45 minutes.

In addition to the above, the provincial government of Ontario have strictly enforced an Act compelling nurserymen to fumigate every shrub and tree sent out by them from their nurseries, whether the San José Scale had been found in their nurseries or not. These firms have, wisely, acted well up to the letter of the law, and, while complying with the provisions of the Act, by sending out only first-class stock, have sustained their business reputation in the best way possible.

The federal fumigation houses are kept open, with a superintendent constantly in attendance throughout the seasons of spring and autumn shipments of stock. The fumigation seasons for the various stations are as follows:—

Vancouver, B.C.—October 15 till May 1.
Winnipeg, Man.—March 15 till May 15, and October 7 till December 7.
Windsor, Ont.—March 15 till May 15, and September 26 till December 7.
Niagara Falls, Ont.—March 15 till May 15, and September 26 till December 7.
St. John's, Que.—March 15 till May 15, and September 26 till December 7.
St. John, N.B.—March 15 till May 15, and October 7 till December 7.

The San José Scale Act and the amendments which have from time to time been made, are the result of an effort on the part of the Honourable the Minister of Agri-

culture to help the fruit-growers of the Dominion by allowing them to import nursery stock of such new kinds of fruits as from time to time are originated outside of Canada, and which it is claimed by fruit-growers are necessary for the profitable prosecution of their business, but at the same time, to safeguard their interests in every possible way by taking such precautions as would make it practically impossible for any new infestation of the San José Scale to be brought into the country with the nursery stock. The whole expense of the different stations is assumed by the Dominion Government; but all shipments are made entirely at the risk of the shippers or consignees, the government assuming no risk whatever. The packages must be addressed by the shippers so as to enter Canada at one of the above-named ports of entry, and the route by which they are to be shipped must be clearly stated upon each package.

Many horticulturists and nurserymen have availed themselves largely of this concession, and at every point much stock has been imported from the United States and Japan. Nursery stock of all kinds can be imported from Europe without fumigation, as the San José Scale has never gained a foothold in European countries. Certain other plants which are not liable to the attack of the San José Scale are also exempted from treatment under the San José Scale Act. These are: (1) greenhouse plants, including roses in leaf which have been propagated under glass; (2) herbaceous perennials, including strawberry plants; (3) herbaceous bedding plants; (4) all conifers; (5) bulbs and tubers; (6) cottonwood (*Populus monilifera*), grown in Minnesota and the Dakotas.

Remedy.—Frequent inquiries are made as to whether there is a practical remedy for the San José Scale. I believe that it may now be justly claimed that the lime and sulphur wash made by any of the recognized formulæ is a reliable remedy for this insect. Orchards which have been carefully treated, are in better condition than they were at this time last year, and have borne during the past summer satisfactory and profitable crops of fruit. No remedy, however perfect it may be, will give good results unless great care is taken in applying it; and even with the lime and sulphur wash, it is not claimed that a single application will always give perfect results. Any remedy which does not cost too much for labour and materials, and which will ensure a paying crop, is certainly a practical remedy. All remedies will vary in the degree to which they secure the ends aimed at, and all that is claimed for the lime and sulphur wash for the San José Scale, is that up to the present, all things considered, this has proved the best remedy, and is, at any rate, as successful in its results as any known remedy which is used in medicine for controlling the diseases of animals or human beings. Success with any remedial treatment will necessarily always depend on the thoroughness with which it is carried out.

The making of the Lime and Sulphur wash is described with full details in my last report.

The Canadian wash is made by mixing lime and sulphur together in the proportion of twice as much lime as sulphur, and boiling these together in an iron kettle for two hours (or not less than one hour). The quantity of water added to make up the required amount of wash is largely a matter of convenience in using. When boiled with steam, barrels may be used, and to begin with, should be one-quarter filled with water and the steam turned on until the water is boiling; then turn off the steam and put in the lime and sulphur together as quickly as this can be done without making the mixture boil over. When the lime is all slaked, turn on the steam again, and leave the mixture boiling for at least an hour. In Mr. Geo. E. Fisher's outfit, which has been frequently described and has been figured more than once, eight barrels of wash were cooked at once, and he found that with steam at 80 or 90 lbs. pressure, the quarter barrels of water, before the lime and sulphur were turned in, could be brought to a boil in five minutes. Mr. Fisher secured the best results when each gallon of the wash contained one pound of lime and half a pound of sulphur.

The Oregon wash consists of lime 15 pounds, sulphur 15 pounds, blue vitriol 1½ pounds. Dissolve the lime and sulphur by boiling for one hour, then add the blue

vitriol dissolved in hot water, and boil for fifteen minutes longer; fill up to 50 imperial gallons.

The California wash consists of lime 15 pounds, sulphur 15 pounds, salt 15 pounds, water 50 imperial gallons.

The Lime-Sulphur-Soda wash consists of lime 40 pounds, sulphur 20 pounds, caustic soda 5 pounds. In making, the 40 pounds of lime is placed in a barrel, and only enough water is added to make it boil rapidly. While slaking, 20 pounds ground sulphur, which has been made into a thin paste, is stirred in thoroughly; the five pounds of caustic soda dissolved in hot water is then poured in, with more water as needed, and the whole is kept stirred thoroughly all the time. As soon as all chemical action ceases, as shown by the absence of bubbling in the mixture, add hot water up to 50 gallons, and the wash is ready for use. The whole time necessary is twenty minutes.

Dr. E. P. Felt, the State Entomologist of New York State, has made a further modification in this formula, by which he substitutes ordinary washing soda for caustic soda and has secured equally good results.

In all of the above mixtures, it is best to use hot water, and to have the sulphur powdered so as to help the rapid combination of the constituents.

The lime and sulphur mixtures must only be used as winter washes while the trees are dormant, or the trees will be injured. The best time is late in spring, just before the buds expand. If necessary, they may be followed in summer by applications of whale-oil soap solution, one pound to six gallons of water, or kerosene emulsion in the dilution of one part in nine of water.

Plum Aphis (*Aphis prunifolii*, Fitch).—The Plum Aphis was found rather abundantly on plum trees in Prince Edward Island, and Mr. Saxby Blair found it also troublesome in the orchards at Nappan, N.S. He writes: 'The pests that have worried me most are the plum and apple aphides. They are perfect nuisances. I thought I had them all controlled this year by early spraying, twice with whale-oil soap, one to six, but later on they appeared in myriads on some of the trees. It seems almost impossible to get men to spray their trees thoroughly enough to get at all of the plant-lice. Any information you can give about Plum Aphis will be useful to our fruit-growers; for this insect is becoming a general pest. Another thing is this: you advise whale-oil soap; now the average farmer in this country cannot get whale-oil soap. I tried to get some in this locality last summer, and they wanted 20 cents a pound for what they called whale-oil soap. If you can give in your report definite information where this soap can be procured, and what the usual price is, it would help. Could you not give instructions by which it could be made by the farmers themselves? I must say I find the whale-oil soap much easier and more convenient to use than bothering with tobacco water. Tobacco stems in most places are very difficult to get; but if whale-oil soap is just as good and can be got easily, that is what the average man will use. I find, too, that it takes much more liquid to do thorough work with tobacco wash than with a strong solution of soap.'

Remedies.—The standard remedies for plant-lice are soap washes and kerosene emulsion. Strange as it may seem, dark-coloured species of plant-lice certainly require stronger applications than the green kinds.

Kerosene emulsion in the dilution of one part to six of the stock emulsion has given good results against all kinds of aphides.

Soaps.—The most effective soap wash is made with whale-oil soap, one pound to from four to six gallons of water. The term whale-oil soap is merely a trade name for a fish oil soap, made with either potash or soda. The potash soaps, which are the best, because even strong solutions remain liquid when they cool, are soft soaps. The soda soaps are hard. Of the two the potash soaps are considered the best to use on vegetation, and they are more convenient to use. Both kinds should always be dissolved in hot water.

When bought at retail prices these soaps cost from 15 to 20 cents per pound, according to the locality, but, if obtained in large quantities, can be got at from 3 to 5 cents per pound. Fifty pound kegs are supplied at 5 cents per pound. Two well known brands of potash soft soaps which have been much used in Canada and have given good satisfaction, are those made by W. H. Owen, of Port Clinton, Ohio, and by Good & Co., of Philadelphia, Pa. If thought desirable, these soaps can be made at home; but it is very unpleasant and dirty work, and it is besides doubtful whether such good or cheap results can be secured as by buying from firms which make a special business of manufacturing soaps with only the required amount of moisture and the proper grade and amount of potash. It has been found in experiments carried on at Washington that what is required for spraying purposes is a caustic potash and fish oil soap, made with a fairly good quality of fish oil and from which water has been eliminated by boiling, so that it does not exceed 25 or 30 per cent of the weight of the soap. Soaps made with caustic soda instead of caustic potash are unsuitable for spraying purposes. Dr. J. B. Smith, in his circular No. 5, 'Whale Oil Soap and its Uses,' says: 'Whale oil or fish oil soap is one of the most reliable materials for use against plant-lice, and generally against sucking insects which can be killed by contact insecticides. It kills by clogging the spiracles or breathing pores of the insects and also to some extent by its corrosive action. The advantages of fish oil over ordinary laundry soap lie in the greater penetrating power, in the fact that it remains liquid when cold at much greater strengths, and that fish oil itself seems to be more fatal to insect life than other animal fats. A good soap can be made as follows:—

Concentrated potash lye	3½ lbs.
Water	7½ gallons.
Fish oil	1 gallon.

Dissolve the lye in boiling water, and to the boiling solution add the fish oil: continue to boil for two hours, and then allow to cool. Any grade of fish oil will answer.'

The Plum Curculio (*Conotrachelus nenuphar*, Herbst.).—The Plum Curculio made serious inroads into the sparse crop of plums of 1904. It was complained of in all localities east of and including Ontario, and was perhaps the fruit pest most mentioned by correspondents. Plums, apricots, cherries and apples were injured.

The injury of the Plum Curculio is known by sight by thousands of fruit-growers who have never seen the beetle to recognize it as the cause of the injury which they know so well on their fruit. The beetle itself (Plate I., figs. 2*a* and 3) is less than one-fourth of an inch in length, brown and rough, with black and gray mottlings, which give it a remarkable resemblance to a small piece of bark, and make it very difficult to distinguish. There is only one brood of this insect in the year; but perfect insects may be found at all times, because the beetles which emerge during August or September of one year, pass the winter as perfect insects under dead leaves, &c., and feed on the buds and leaves of plum trees early in the spring, and later during the season on leaves and fruit of various kinds; the old insects of the year before may often be collected at the same time as the newly emerged brood. When plums are about as large as pease, the crescent-shaped slit, with a small flap containing the egg, may be seen upon them. The egg hatches soon after, and the white grub (Plate I., fig. 2*c*) bores into the fruit, so that in the case of the plums they soon fall from the tree. The peach, apricot, cherry, apples and pears are also injured, but do not fall from the trees to nearly the same extent as plums. A great many more of the larvæ of the Plum Curculio come to full growth in plums than in the other fruits: the rotting of the fruit seems to be necessary for these grubs to mature. There is no doubt that by far a larger number of the grubs become beetles when they have fed in plums and cherries than in any other fruit. In apples, to which it causes serious injury also, from the disfiguring of the fruit, very few larvæ mature. By midsummer the larvæ are full grown and burrow a short distance into the ground, where they turn to pupæ, and the adult beetles emerge in August.

Apples badly disfigured were sent by Mr. C. L. Stephens, from Orillia, Ont., and similar samples were also received from two or three localities in Quebec province.

Remedies.—The remedies for the Plum Curculio are as follows : (1.) Spraying the trees early in the season so as to destroy the beetles which for some time feed upon the buds and opening leaves of plum trees. The second spraying, with poisoned Bordeaux mixture, should be made when the plums are about as large as pease. This will coat the young fruit so that the beetles are destroyed when they feed on the fruit or cut the crescents for egg laying. (2.) The destruction of all windfalls or injured fruit that drops, so as to clear away all fruit before the larvæ emerge and enter the ground to pupate. Poultry, pigs and sheep help well in this work. (3) The ploughing up and cultivation of orchards so as to remove grass and other vegetation which, besides weakening the trees, gives places for the insects to hide in. The depth at which the larvæ pupate is about an inch beneath the surface, and the pupation in this part of Canada takes place during July ; therefore cultivation during that month will destroy many of the pupæ, and this has been found the remedy which has given the best results in old orchards which had been in sod for many years and in which the fruit had been seriously injured year after year. (4.) The jarring of plum trees, which is much written about and highly recommended, will certainly destroy many of the beetles, but costs too much for labour when compared with spraying with insecticides, which give more certain results in my experience. As the plum and peach are rather easily injured by some arsenical poisons, arsenate of lead, 1 lb. to 50 gallons, is preferable to Paris green for these trees.

The Apple Maggot (*Trypeta pomonella,* Walsh).—The Apple Maggot has never done much harm in Canada, although its injuries are very serious in the apple orchards of Main and some other States adjoining our borders. The slender white maggots, about a quarter of an inch in length, burrow in all directions through the flesh of attacked apples, feeding upon the pulp and leaving discoloured channels (Plate I., fig. 5). There are sometimes as many as a dozen maggots in a single apple, but even one is sufficient to render it worthless. The eggs are inserted beneath the skin of the fruit by beautifully marked black and white flies, with shining greenish golden eyes. The general appearance of the fly is shown in Plate I., fig. 6. In size it is about half as large as the ordinary house fly. There is only one brood in the year, and the eggs are inserted into the fruit by the females with a sharp ovipositor. Egg-laying takes place from the beginning of July until autumn. The young maggots become full grown in about six weeks, and their work, as a rule, causes the fruit to ripen prematurely and fall to the ground, when the maggots work their way out and enter the soil for a short distance, where they change to pale-coloured puparia, but inside which they remain as maggots until the following spring The pupa forms only a few days before the perfect insects appear the next summer. The maggots of late-laid eggs are frequently in the fruit at the time it is picked, and these develop, destroying the fruit more and more as they grow. Apples apparently sound when gathered may, by the presence of eggs or young larvæ, afterwards become perfectly useless. The development of the maggot is slower in late and hard fruits.

In September last I received from Mr. R. W. Shepherd, the well known apple shipper, of Como, Que., samples of infested Fameuse apples, with the following information:—

'Montreal, Que., September 26.—I mail you to-day specimens of Fameuse apples taken from one of my orchards, an old one, which show serious blemishes. There is some disease unknown to me which has affected some of the Fameuse trees in that orchard. The outside skin of the apples shows dents, and, when the apple is cut open, there are brown punky spots in the flesh; the fruit is generally undersized, and in any case is practically worthless for sale. No other varieties are affected here, as far as I have been able to learn; but there are some other orchards which are suffering in a similar way to my own.

'October 10.—It is only my old orchard, which has been replanted at different times, that is badly affected. I have pigs there eating up the fallen fruit. I do not notice the maggots affecting any other variety than Fameuse, and in that orchard there are St. Lawrence, McIntosh Red, Scott's Winter, and other varieties. I noticed this injury last year for the first time, when the Shiawassee Beauty was affected. At that time I thought it was a fungus affecting the inside of the apple.

'October 20.—I am glad it was right to put pigs in the orchard; and, as they do not eat up the apples fast enough, I have given instructions that a herd of cows should be put in every day to make sure that all the fallen apples are done away with.'—R. W. SHEPHERD.

'Como, Que., October 25.—I thank you very much for your annual report. I am glad to have it, and hope to profit by your suggestions. Last year was the first time we noticed the Apple Maggot in our fruit; but it has increased a good deal this year. The McIntosh Red does not seem to have been troubled like the Fameuse, but Russets have.'—M. L. GIBB.

In addition to the above occurrence, apples from St. Hilaire, another celebrated locality for the production of first-class Fameuse apples, showed slight infestation. Como is thirty miles west of Montreal, and St. Hilaire twenty-three miles east.

Early and subacid varieties of apples seem to be preferred; but all varieties are said to be liable to attack, including late and winter varieties. When the late varieties are infested, the maggots do not emerge until some time during the winter after the fruit has been stored, the larvæ emerging and the pupæ forming inside the barrels or bins. The destruction of these pupæ and of all fruit when it falls to the ground during the summer and autumn constitutes the most reliable remedy for this injurious insect. The fallen fruit may be collected by children and fed to stock; or sheep and swine may be turned into the orchard from about the middle of July. Poultry will destroy many of the maggots and puparia beneath the trees. Late autumn ploughing will throw up many of the puparia to the surface of the soil, where they will be destroyed by birds, &c. Although the Apple Maggot has never done very much harm in Canada, the losses in Vermont, Maine and parts of New York State are sometimes extensive, occasionally amounting to 50 per cent of the fruit; and, as the injury does not show much on the outside, the uncertainty as to whether fruit is attacked or not renders it useless for sale. It may be well to point out here that, as the egg is inserted beneath the skin of the apple by the female fly, spraying with arsenical mixtures is quite useless as a remedy for this insect.

CODLING MOTH (*Carpocapsa pomonella*, L.).—One of the striking characteristics of the season of 1904 is the absence of injury by the Codling Moth, and this seems to be the case in all the fruit-growing districts of the country. I fear that this state of affairs may have an injurious effect by inducing many to give up spraying their orchards for the control of this pest. The absence of the Black Spot disease of the apple in 1903 had just this result during the past season. In some orchards which were free from disease in 1903, no spraying was done this year, and, as a consequence, what might have been beautiful crops have been ruined. Fungous diseases, although not caused by climatic conditions, are checked or developed enormously in accordance with favourable weather conditions or the reverse. The fruit-grower who is a good business man, has learnt before this that there is no longer any question as to whether spraying pays or not. That it does, is manifest every year by the predominant excellence of the fruit from all orchards which are sprayed, both as to insect presence and as to injury by fungous diseases. Mr. R. W. Shepherd, of Como, Que., and other buyers of the very best apples for the European market, assure me that, when purchasing the high quality fruit they require for that purpose, they cannot afford to waste time even in looking at orchards which have not been sprayed.

Although the Codling Moth was less destructive than usual this year, the presence of the eggs on apples and of the larvæ in fruit could be detected if closely looked for.

The weather throughout the past season has been such that insect occurrence of all kinds has been markedly less than has been the case for the last thirty years, so that the small numbers of the Codling Moth larvæ seen this year must not be taken as an indication that this most injurious enemy of the apple has disappeared to such an extent that spraying for it is no longer necessary. Moreover, it must be remembered that, by spraying apple trees at the times advised, viz., just when the buds are bursting and once a fortnight for two months afterwards, not only is the Codling Moth kept in check to the extent of saving an average of from 75 to nearly 100 per cent of the fruit, from its ravages, but also a great many other insects as well as fungous diseases are destroyed, giving the fruit-grower an enormous profit, compared with the cost of spraying.

Green Fruit Worm (*Xylina*, sp.).—When examining orchards at Gagetown in New Brunswick, as well as in the Annapolis Valley and other places in Nova Scotia in June last, I frequently came upon the larvæ of a *Xylina*. These caterpillars, of which there are many species very similar in appearance, are known by the name of Green Fruit Worms, and have the habit of gnawing large cavities in the sides of apples, as well as devouring the foliage. The perfect moths from these caterpillars emerge in the autumn, and after passing the winter as such, lay their eggs on the trees in spring. The best remedy is the regular spraying of fruit trees with the poisoned Bordeaux mixture.

The Red-humped Caterpillar (*Schizura concinna*, S. & A.).—This caterpillar feeds upon a great many different kinds of trees besides the apple, and is seldom destructive except upon young trees. The eggs are laid in clusters, and the caterpillars are gregarious throughout their lives. Mr. E. P. Venables, of Vernon, B.C., reports that they were numerous in his locality last summer and did much damage in young orchards, in many cases the whole foliage being stripped from infested trees. He detected a hymenopterous parasite which was doing good, and is now rearing specimens so as to learn the identity of this useful insect.

The Shot Borer (*Xyleborus dispar*, Fab.).—There were several complaints from fruit-growers in the Annapolis Valley, N.S., of injury to apple and plum trees by the small wood boring beetle, which has received the name of the Shot Borer (Plate II, fig. 7). There has not been much complaint concerning this insect since 1897, but last spring its work was noticed in many places in the above district. The attack consists of a small black burrow (Plate II, fig. 8), beginning generally at a bud and running right round the stem inside the wood and near the bark of young living trees. Inside this there is often another burrow, and then a short perpendicular shaft at right angles running down the centre of the twig or branch. There is variation in the nature of the tunnels, according to the size of that part of the tree where they are located ; but they are always about one-sixteenth of an inch in diameter, and if in a small branch or stem form a circular gallery with an ascending or descending perpendicular shaft, which serves as a brood chamber. When, as is sometimes the case, they occur in trunks of young trees of moderate size, from 4 to 6 inches in diameter, the galleries are straighter and simpler. These galleries are the homes and breeding chambers of the larvæ and their mother; for, although this insect is the cause of much injury to trees, with the exception of the wood which is gnawed out to make the tunnels, the tissues of the wood are not eaten either by the mature beetles or the larvæ; but the tunnels form caves within which a special kind of fungus is cultivated by the beetles as food for the larvæ, which simply lie in a small cell and feed or are fed by their parents on the fungus as it grows. An account of these beetles and their method of feeding upon the 'ambrosia' is most delightfully described by the late H. G. Hubbard, in an article entitled 'The Ambrosia Beetles of the United States,' one of the most charming narratives to be found in the literature of Economic Entomology. (See Bulletin No. 7, n.s., U. S. Division of Entomology.)

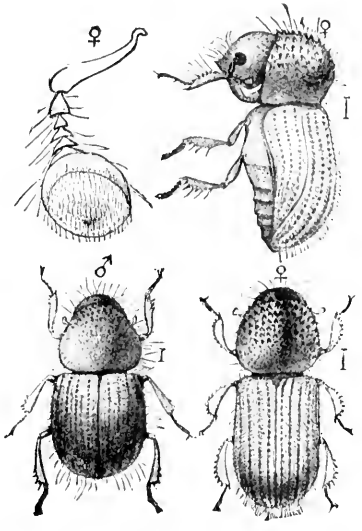


Fig. 7. Shot-borer: ♂ male; ♀ ♀ female enlarged; antenna of female more enlarged.
(Figs. 7 and 8 from H.G. Hubbard, U.S. Dept. of Agriculture.)

Fig. 8.—Gallery of Shot-borer in twig, cut across and lengthwise.

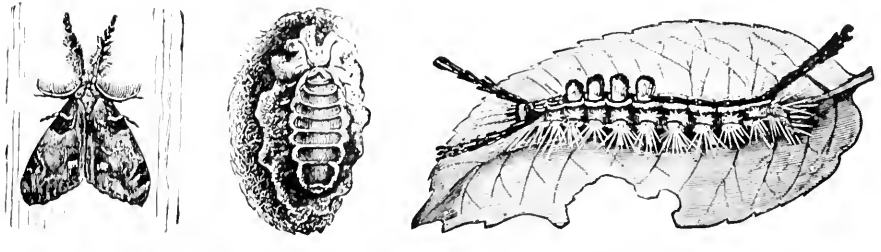


Fig. 9.—The White-marked Tussock-Moth male, female and caterpillar.

Fig. 10.—Branch of Canada Balsam Fir, with roots from base covered by sand. *(Photo. by F. T. Shutt.)*

The remedies for this insect aim at either filling up the entrances to the holes in which the broods are being reared, so as to suffocate the larvæ, or in applying some liquid which will penetrate and destroy the fungous food or the larvæ and mature beetles while in the holes. For this purpose, kerosene oil and carbolic washes have been used with success; crude petroleum could probably be used with even greater effect, as on account of its extreme subtility it would penetrate the burrows more deeply than most liquids, and also would act as a deterrent wash which would keep the mature beetles away from the trees when seeking places to make their breeding burrows.

The carbolic wash which has given good results in Nova Scotia is soft soap, 1 gallon, water 3 gallons, crude carbolic acid ½ pint; the trees to be washed two or three times when the beetles are known to be prevalent. A difficulty with this insect will be found in the intermittent nature of its occurrence. As it is pretty sure to be present in some numbers in the same orchards where it was troublesome last spring, it will be wise for the owners to spray or wash their trees with a deterrent wash next season. Trees noticed to be badly infested at the time of winter pruning should be cut out and burnt before the beetles appear in spring, unless considered to be of special value, when they may be treated.

The Black Vine Weevil (*Otiorhynchus sulcatus*, Fab.).—This weevil seems to have become a regularly occurring pest in gardens around Victoria and some other places on Vancouver Island, and also near New Westminister and Vancouver on the mainland. It is a black snout-beetle, three-tenths of an inch in length, of a dull black, the wing cases being deeply grooved and spotted with fine white points. The grubs are yellowish white, with dark heads, and have the body somewhat curved; they feed on the roots of several kinds of plants. These beetles have no true wings and the two wing-covers are connate or joined together in the middle, so their only means of spreading from place to place is by crawling. The beetle occurs near the coast on both sides of the continent and is sometimes a destructive pest in strawberry beds in Nova Scotia and British Columbia. The plants which have been reported to me as injured by the Black Vine Weevil in Canada do not include the grape vine; the name Black Vine Weevil is taken from European publications, where it is the recognized popular name, and will answer here until a better is suggested. The grubs probably do more harm than the adult weevils and have been found attacking the roots of Cyclamens and other plants in greenhouses, particularly Gloxinias, Primulas and Maiden-hair ferns. The most important injury so far recorded against this weevil is of its attacks upon strawberry beds. Mr. J. R. Anderson, reporting on the insects of the season, says 'the Black Vine Weevil did a considerable amount of injury to strawberry beds. This was principally on the lower Fraser. It also attacked the roots of Primroses in some localities.'

'New Westminster, B.C., May 30.—The Strawberry Weevil (*Otiorhynchus sulcatus*) is very bad in several places this spring, and I find that in every case where strawberries are infested, they have been planted on land where the sod had been turned in previously, and that in neighbouring patches where no sod had been turned in they are comparatively few.'—W. D. Dashwood-Jones.

'Victoria, B.C., May 30.—I send you specimens of larvæ and pupæ of an insect which is in large numbers in a strawberry bed at Esquimalt, near here. I take these to be *Otiorhynchus sulcatus*; am I right? There are many complaints of injury to strawberry plants this spring from this or a similar pest, chiefly along the Fraser at Hammond, Haney and Mission, but also in the Victoria district.'

'June 13.—I will send you further specimens of *O. sulcatus* from Mr. Fleming's garden near Victoria, and I will also try and get you other specimens from the lower mainland, where by the bye, I am told by Mr. Cunningham that there are two distinct species of weevils infesting strawberry plantations.'

'June 20.—I send you a box containing specimens of weevils, principally in the pupal form, but also including some beetles which were taken from strawberry fields

at Hammond. You will see that there are two species, one much smaller than the other. From the appearance of the infested plants, I take the larger specimens to be either *Tyloderma fragariæ*, or *T. foveolatum*. Will you kindly identify and suggest remedial measures?—R. M. PALMER.

The specimens sent forward by Mr. Palmer were extremely interesting, and showed distinctly the work of two different insects which attacked the roots in a similar manner, but could be easily distinguished. All the plants sent were old plants, with large crowns, from a stout caudex; and it was into this that the larvæ bored from the outside, leaving large cavities, and in some instances destroying the whole of the interior of the stems. By the time the parcel reached Ottawa, most of the specimens were pupæ, and from these a little later I reared several specimens of the Black Vine Weevil and of the SLEEPY WEEVIL *(Otiorhynchus ovatus,* L.). This latter is a common weevil, and is a curious slow moving creature, which is frequently found in out-of-the-way places. It may always be found out of doors at almost all times of the year, when sifting moss or leaves to collect beetles. It frequently penetrates into houses, sometimes in large numbers, and it has even been accused, with every appearance of good reason, of having inflicted very painful bites on campers sleeping in tents during the summer time. It occurs commonly throughout Canada east of the prairies, but I had not heard of it previously from British Columbia. The Sleepy Weevil has occasionally been accused of injuring potatoes, and Mr. P. J. D. Edmonds sent me from Summerville, P.E.I., specimens with potato leaves, and the following note: 'I send you a sample of a new kind of potato beetle, showing the way he folds himself up after cutting off the branches of potatoes. Please let me know what this is, and whether he is doing damage or how he can be destroyed. I did not actually see this field, but I am told that many of the stalks are stripped bare of leaves.'

The Sleepy Weevil is only about half the size of the Black Vine Weevil, and is of a dull pitchy brown colour, smooth and without any markings. It is always a very slow moving beetle, and it is probable that some injury may have been attributed to it for which it was not responsible. From its habit of hiding in dark corners, folded leaves and in hollows, it is frequently found in close proximity to injury which may have been done by other culprits. There is now no doubt that the larvæ feed on the roots of strawberries, and it is probable that they also attack the roots of many other plants. I have frequently found the beetles in old grass fields, and I shall not be surprised, especially after the observation made by Mr. Dashwood-Jones that strawberry beds planted on sod were most injured by weevils, to find that the usual food plant of both the Sleepy Weevil and its larger companion, the Black Vine Weevil, may be the roots of grasses. Should these insects become abundant in strawberry beds it will be well for growers to adopt the one-crop plan which has been used very successfully by Mr. Macoun, the Horticulturist of the Central Experimental Farm, and was adopted many years ago by Mr. Peter Dempsey, at Trenton, Ont. This consists of setting out new beds of strawberries in the spring, cultivating these for the first summer, taking one large crop of berries the next spring, and then ploughing the plants up as soon as the crop is off. In the meantime a new bed will have been set out from the runners of the bearing bed early in spring before the fruit ripened. This plan of strawberry culture not only prevents loss from the attacks of such enemies as the White Grub and the above-mentioned Weevils, but is also a paying operation, giving better returns from the higher price secured with the large fruit thus grown than from a large crop of smaller berries.

Both of the weevils here treated of are nocturnal, doing such injury as is attributable to them at night and remaining quiet by day, hidden away in crevices or beneath rubbish and other shelters. They can, therefore, be trapped in considerable numbers by placing objects about the beds convenient for them to hide in by day, and also easy of examination for the destruction of the beetles.

FOREST AND SHADE TREES.

No widespread or extensive injury to forest or shade trees was brought to my notice during the past season, but there were many inquiries sent in with specimens for information concerning these insects.

Tent Caterpillars of several species, which a few years ago were so enormously abundant, but which everywhere suddenly decreased in 1900, seem to be again increasing in certain districts, not only on forest trees, but also in orchards. There is some confusion as to the species mentioned in reports; but western references are probably to *Malacosoma (Clisiocampa) californica*, Pack., and *M. americana*, Fab., northwestern to *M. disstria*, Hbn., and *M. fragilis*, Stretch, and eastern to the Apple Tree Tent Caterpillar, *M. americana*, and the Forest Tent Caterpillar, *M. disstria*.

Mr. J. R. Anderson says:—

Victoria, B.C., Nov. 1.—The Tent Caterpillars again appeared in larger numbers than usual this year. In some localities on the lower Fraser and in those places where no steps were taken to check their ravages, fruit and ornamental trees were utterly defoliated, and this was also the case with trees and bushes on the roadside.'

When travelling in northern Alberta last summer, holding meetings with Mr. T. N. Willing, the Territorial Weed Inspector and Entomologist, I found, on July 21, two destructive colonies of what I took to be the Forest Tent Caterpillar *(M. disstria)*. The first one was in a bush of many acres of Aspen Poplars, a few miles out of St. Albert. The moths were in thousands and were just emerging from the cocoons. Only a few dipterous and hymenopterous parasites were noticed at large or detected by their larvæ in the cocoons. The second colony was close to the town of St. Albert and was less extensive than the first one referred to, the chief injury being done on the tops of young aspen trees. Earlier in the season Mr. Willing sent me specimens of the larvæ of *Malacosoma fragilis*, Stretch, which he had found abundant on rose and other bushes at Medicine Hat. There are a few reports of injury by Tent Caterpillars in orchards and wood lots in western Ontario; and I hear from Nova Scotia that Tent Caterpillars are evidently again increasing in numbers.

The remedy for all these species, where practicable, is prompt spraying as soon as the young caterpillars appear, with poisonous mixtures.

Basswood Looper [*Erannis (Hibernia) tiliaria*, Harris].—Mr. T. N. Willing found caterpillars of this eastern moth very abundant on the flat north of the south branch of the Saskatchewan at Medicine Hat. They were stripping the Negundos or Ash-leaved Maples (also called Box-elders in the United States), and skeletonizing all the leaves on some trees over an area of more than two acres. A moth was reared from these caterpillars, which like the larvæ, did not appear to differ in any way from eastern specimens.

The Negundo Twig-borer (*Proteopteryx willingana*, Kearf.).—For many years the Ash-leaved Maples grown at Winnipeg, Brandon, Regina and other points in the West as street shade trees, have been injured every season by the caterpillars of a small moth, which burrow in the bases of small twigs and branches, and hollowing these out, cause them to swell and form elongated galls. These have occasionally been reared, and some years ago moths were sent to a specialist who identified them as *Protecteras æsculanum*, Riley. Under this name the insect has been referred to until the present season, when several specimens were reared by Mr. T. N. Willing, of Regina, and were forwarded to Mr. W. D. Kearfott, a specialist in microlepidoptera.

(See 'Canadian Entomologist,' vol. xxxvi., 1904, p. 306.) After careful examination they were decided to be an undescribed species, which was named in honour of Mr. Willing, as a recognition of the excellent work he is doing in working up the natural history of the North-west Territories. The caterpillars attain full growth during June and then leave their burrows in the twigs, and penetrating a short distance into the ground, spin close cocoons from which the moths emerge early in July. Some caterpillars of this moth, however, reared here in the Division of Entomology, pupated in the twigs where they had been feeding. It cannot be said that this insect does very serious injury to the Negundos; but it is sometimes extremely abundant and by destroying shoots makes it difficult to train these favourite trees in the way desired by those growing them as shade trees.

The Negundo Plant-louse (*Chaitophorus negundinis*, Thos.).—As might be expected from the enormously extended area over which the Ash-leaved Maple or Box-elder is cultivated of late years, the insects which attack it are gradually spreading from the west with their host plant. One of the most troublesome of these is the Negundo Plant-louse, which for many years has been a disgusting pest of shade trees in the West, covering the trees with honey-dew during the summer and making them very unsightly objects instead of ornaments, in the streets, by reason of the copious growth of the Sooty Fungus (*Fumago salicina*), which always develops as a consequence of their attack. From several points in Ontario during the past summer, even as far east as Ottawa, this plant-louse was reported upon the Ash-leaved Maple trees. When not controlled by spraying with kerosene emulsion or whale-oil soap solution, these plant-lice do serious injury to the trees they infest; and they are so persistent in their attacks that many lovers of trees in the West have given up the cultivation of the desirable and quick-growing Negundo, for other trees less subject to insect attack.

The Aspen Beetle (*Lina tremulæ*, Fab.).—Mr. Norman Criddle, of Aweme, Man., writes: 'These beetles, which three or four years ago were so enormously abundant and did so much harm by stripping the aspen poplars, are once more on the increase. They were especially destructive to the young shoots of the aspens, causing many young trees to die.'

In 1900 and 1901 this bettle was so abundant and destructive on the prairies that many miles of beautiful aspen poplars so useful in that country for firewood and shade, were stripped bare of foliage, and a great many of the trees died. This was particularly the case in the Tiger Hills, Man., and in the Moose Mountain and Qu'Appelle districts, N.W.T.

Willow Beetles.—For the last three years willows in the prairie provinces and in British Columbia have been very much injured by the small chrysomelid beetle, *Galerucella decora*, Say. This is a small brown beetle, soft, and rather flat in shape, which, both in the perfect and larval states, feeds on various kinds of willows, stripping the green surface of the leaves and leaving the bushes scared and brown. Mr. Criddle says: 'Willows at Aweme were completely stripped by these beetles and their larvæ. Later in the season, aspen poplars (*P. tremuloides*) were also attacked by the same beetles to such an extent that any one knocking a tree would shake down countless numbers from the leaves, which sounded, as they fell on the dead leaves beneath, like a shower of rain. These insects pass the winter beneath the dead leaves, and attack the trees as soon as they come into leaf the following spring. Many trees were killed by them some years ago.'

The Vancouver Island Oak-Looper [*Therina (Ellopia) somniaria*, Hulst].—As stated in my report for 1890, the beautiful oaks on Vancouver Island are periodically stripped, every few years, by hordes of the caterpillars of a geometrid moth. 1904 saw one of these visitations. Mr. J. R. Anderson writes: 'The Oak Looper (*Ellopia somni-*

aria) appeared in vast numbers in some places on Vancouver Island this year. Strange to say, in certain localities they were entirely absent, but in others they were so numerous that they consumed every particle of their natural food, and they would then attack other trees. In one place, which I was called to inspect, I found that they had attacked even the fruit on apple trees, eating away a layer of the skin and large holes into the interior near the stem. They were also denuding the apple trees of their leaves. There were hundreds on one tree which stood beneath an oak. The larvæ had defoliated the oak tree, then let themselves down in the usual manner, and were on the apple tree in hundreds eating the foliage and fruit. Other trees, as cherry, elm, &c., farther away were also attacked, but not so much as those near the oaks.'

This variation in the food habits of this insect can, I think, only be considered as exceptional. The natural food of the species in Vancouver Island is the picturesque oak, *Quercus jacobi*, R. Br., which grows round the southern end of Vancouver Island. Among the caterpillars forwarded by Mr. Anderson, some parasitized specimens were found, from which was raised a parasite which has been kindly identified by Mr. W. H. Harrington, as *Pimpla Ontario*, Cress. Another parasite, the species usually responsible for the sudden reduction in the numbers of this species, is *Ichneumon cestus*, Cr., a yellowish brown ichneumon fly about three-eighths of an inch long, with one black band across the abdomen, and was found in considerable numbers by Mr. A. W. Hanham, who writes:—

'Victoria, B.C., October 25.—The moths of the Oak Looper (*E. somniaria*) have this autumn been a sight to see. Out the Cadboro Bay road large oak trees were covered with the moths a couple of weeks ago, particularly on the underside of the branches and close to the trunks. There were numbers of a reddish brown ichneumon, all of one species, which were flying about the trunks of the trees. I bottled several of these, which I send you.'

The specimens forwarded by Mr. Hanham were *Ichneumon cestus*, Cr.

The White-marked Tussock Moth [*Hemerocampa (Orgyia) leucostigma*, S. & A.] —This common pest of city shade trees, which was referred to at some length in my last report, continues to injure shade trees in some of our cities. The most effective remedies are the collection of the egg masses in winter and the spraying of the trees with arsenical poisons in spring before the caterpillars (Plate II., fig. 9) have grown much and injured the leaves. The Toronto civic authorities are this year taking active measures to clear out the infestation, which for many years has injured the appearance of the beautiful horse chestnut trees for which Toronto is celebrated. A reasonably large sum of money has been voted for the collection and destruction of the eggs during the present winter; and there is every reason to hope that by this means private individuals may be stirred up to do their duty in the public interest by destroying the eggs on their own trees in winter and then spraying the foliage in summer for a year or two.

Walking Stick Insect (*Diapheromera femorata*, Say).—A remarkable outbreak of the Walking Stick Insect, which is worthy of record, is reported by Mr. J. B. Williams, of Toronto. This is usually a rather uncommon insect; but Mr. Williams found it in such numbers in the Niagara Glen that thousands might have been collected on oak and butternut trees during September. These trees are ordinary food plants for this curious insect, which belongs to the Phasmidæ, a division of the Orthoptera, the same order as contains the locusts and grasshoppers.

THE APIARY.

The Apiary, as in the past, has been under the management of Mr. John Fixter, the farm foreman, whose report I append herewith. The same experiments which have been carried on for some years have most of them been repeated on account of the large amount of interest which has been evinced in the subject by correspondents and visitors to the Central Experimental Farm. The services of Mr. Fixter have been asked for at a great many meetings of bee-keepers, and, whenever his duties at the Central Experimental Farm would permit of it, he has attended these meetings and given addresses.

REPORT OF MR. JOHN FIXTER.

Season of 1904.

The honey crop in the Experimental Farm Apiary has been a fairly good one, giving an average yield of 63 pounds per colony.

In many parts of the Dominion the honey crop was light, owing chiefly to the very heavy losses of the past winter. Many colonies of bees perished from cold, while they had abundance of stores in their hives. The continued long spells of severe weather prevented them from breaking their clusters to reach their stores. Losses were greater in outside than in inside wintering, although many perished inside, either from insufficiency of stores or from confinement in cool, damp and badly ventilated cellars.

Experiments have shown that bees can be successfully wintered in a good cellar, even if it is damp, providing it is well ventilated. Many colonies died also during the spring after being set out, owing to the cold, backward season.

The number of colonies, which was 35 in the spring, was increased by swarming to a total of 50 when the hives were put into winter quarters on November 23.

Meetings were attended at the following places in Ontario :—Merivale, Metcalfe, Crossland, Phelpston, Minesing, Grenfell, New Lowell, Stayner, Elpin, McDonald's Corners, Balderson, Innisville, Drummond Centre, Locust Hill, Markham, Gananoque, Toronto and Barrie; and in the province of Quebec at Shawville, Buckingham and Venosta.

Experiments, 1903-1904.

I. CELLAR WINTERING.

Description of the Bee Cellar.—The cellar is below a private house. The walls are of stone and the floor of cement. The bee-room, 11 feet 6 inches wide by 15 feet long and 7 feet high, allows three tiers of shelves and two passages. It is boarded off from the remainder of the cellar by a partition which extends all around the chamber, and far enough from the stone wall to allow of an air space. Should a person have enough bees to fill the cellar the boarding could be left out. Under the cement floor a layer of one foot of stones of different sizes acts as a drain and keeps the cellar perfectly dry. The lowest shelf is 18 inches from the floor, the second 20 inches in the clear above, and the third 20 inches above that. Neither the hives on the third or uppermost shelf nor the uprights supporting the shelves touch the ceiling, so that no vibration can reach the hives from above. This chamber is thoroughly ventilated, as is also the whole cellar.

Before entering the bee room is a smaller compartment with a door leading to the outside and another leading to the bee-room. Both rooms have sliding ventilators in the doors, so that outside air may be let in at will. Ventilation is carefully attended to, and sudden changes of temperature are avoided; for this, a thermometer which is

always kept in the cellar, is watched. The best temperature for the bee cellar has been found to be from 42 to 48 degrees Fahrenheit. This arrangement has given entire satisfaction. In former years there was not proper ventilation, and the cellar was always damp. Since the concrete floor has been laid and the ventilators have been put in, the cellar has been much drier and cleaner. It is also rat and mouse proof, which is a very great advantage.

Experiment No. 1.—The tops of the hives replaced by chaff cushions and the brood chambers raised at the back.

Six colonies were put into winter quarters in the cellar and placed on the shelves. Under the back end of each hive was placed a three-inch block; each hive was, besides, raised from its bottom board by a one-inch block being placed at the back so as to ensure free ventilation. All front entrances were left wide open; the wooden covers were all removed and replaced with cushions made of chaff 4 inches thick, sufficiently wide and long to lap over the hive two inches. Temperatures were taken once each week all through the winter and were kept very even, from 44 to 48 degrees. The bees were quiet, only a very slight hum being noticeable up to February, when the temperature having risen to 48, the bees began to get uneasy and made considerable hum. Cold air was carefully let in during the night by opening the slides in the doors and closing them in the morning; this, of course, lowered the temperature, and the bees quieted down. During the past winter every colony in this experiment was perfectly dry and clean, and all came out in excellent condition. Average weight of each hive when put into winter quarters, 58½ pounds; when taken out on April 22, 49¼ pounds per hive, showing that each hive had lost 9¼ pounds on an average.

Experiment No. 2.—Tops replaced by chaff cushions and the brood chambers raised in front.

Six colonies were put into the cellar and placed on the shelves, a three-inch block being placed only in front, between the bottom board and the brood-chamber, making the full entrance three inches high across the whole front. The wooden covers were removed and replaced with a chaff cushion. Temperature the same as in Experiment No. 1. During the whole winter all the colonies in this experiment were perfectly dry and clean and showed no uneasiness of any kind. The bees could be seen hanging in a quiet cluster below the frames any time during the winter. The average weight when put into winter quarters on November 23 was 59 pounds 12 oz.; when taken out on April 22, 51 pounds 8 oz., showing that each hive had lost on an average 8 pounds 4 ounces.

Experiment No. 3.—Tops replaced by propolis quilts.

Six colonies were put into the cellar and placed on the shelves, with the bottoms of the hives left on, just as they were brought in from the bee-yard. The wooden covers were removed and nothing left on except a tightly sealed propolis quilt; the natural entrance was left wide open. Temperature of cellar same as in Experiment No. 1. During the entire winter the bees kept perfectly dry, and only a very slight hum could be heard. There were but very few dead bees on the bottom board, and no sign of dysentery. On examination when set on their summer stands all the hives were found to be in first-class condition. The average weight when put into winter quarters November 23 was 59 pounds 15 oz.; when taken out on April 22, 51 pounds 3 oz., showing that on an average each had lost 8 pounds 12 oz.

Experiment No. 4.—Tops and bottoms of hives left on.

Six colonies were put into the cellar and placed on the shelves, with tops and bottom boards of the hives left on, just as they were brought in from the bee-yard.

They were watched for dampness, mould, or dysentery, also to compare the amount of honey consumed. Temperature of cellar the same as in Experiment No. 1. During December and January all were very quiet. During February there was considerable humming. Drops of water were noticed along the entrances of three hives. There were but very few dead bees on the bottom board and no sign of dysentery. On examination when set on their summer stands, two of the hives had considerable moulded combs. The average weight when put into winter quarters, 58 pounds 10 oz.; when taken out on April 22, 49 pounds 3 oz., showing that the average loss of each hive was 9 pounds 7 oz.

II.—WINTERING BEES IN DAMP CELLARS.

Many letters are received inquiring whether a damp cellar is a fit place to winter bees in. An experiment was conducted during the winter of 1902-3, with three colonies of bees. During last winter it was thought advisable to try the same experiment (A) with a larger number of colonies—six—and another (B), also with six colonies with a larger amount of moisture.

In both experiments the six colonies were selected, all of about equal strength, and all in Langstroth hives, weighing on an average 58 pounds each at the beginning of the experiment. The wooden covers were removed from the hives and replaced with propolis quilts; the bottom of each hive was loosened from the brood chamber, and a block two inches square was placed at each corner between the bottom board and the brood chamber, insuring free ventilation from the bottom of each hive. The cellar was kept at a very even temperature of 44 to 48 degrees, and was well ventilated during the whole winter. The six hives in each experiment were resting on the edges of seven pails of water, the full surface of the water being exposed.

A.—The bees could be seen hanging below the frames in a quiet cluster all winter. The hives were all examined once each week, and at no time did there appear to be any sign of uneasiness from the extra moisture. There were scarcely any dead bees on any of the bottom boards nor any sign of dysentery, and all came out in excellent condition. The colonies were set out on their summer stands on March 20; the day being fine and warm, all began to fly at once. The average weight of the six colonies when set on their summer stands was 44¼ pounds each. From March 20 to April 5, the weather was cool, and no flying took place up to the latter date, which was a good bright warm day. After this the bees had to remain in their hives until April 22, when the weather became warm again. They then built up rapidly and were in excellent condition for the honey flow.

B.—A second experiment was tried in which the amount of moisture in the atmosphere of the cellar was increased in the following way: Besides the seven pails of water placed on the floor with the six hives resting on the edges of these pails, allowing the full surface of the water to be exposed, six inches of sand was spread on the cellar floor between the pails and covering six inches of the floor outside of the pails. There was also a large cotton sheet spread over the six hives. The sand and sheet were kept thoroughly saturated with water which was poured on them once each week during the winter.

The bees in this test were more uneasy than in the experiment first described where no sand or cotton covering was used, having to keep up fanning for ventilation. There were also a great many more dead bees on the bottom boards and several hives had drops of water along the entrance, but there was no sign of dysentery. On March 20, the day being fine, the colonies were removed to the bee-yard, where all began flying at once. The average weight of the six colonies when set on their summer stands, was 44¼ pounds each. From March 20 to April 22 the bees had but one good flight. After April 22 the weather became considerably warmer; the colonies began building up rapidly, and were in excellent condition for the clover bloom.

The average strength of the six colonies that had the extra moisture was not as great as in the former test, but as soon as they got fine weather they gained rapidly.

Care was taken that the colonies in both tests had plenty of unsealed stores before fruit bloom and between fruit and clover bloom. This was done by uncapping one side of a frame of honey nearest to the cluster, allowing the bees to use up the honey for food and providing space for the queen to lay her eggs. Although so much moisture was in close proximity to the colonies, a great deal of the success of this experiment is no doubt due to the good cellar in which it was tried, the cellar having stone walls, cement floors, good ventilation and the temperature being easily regulated. This goes to show that good ventilation and even temperature have a great deal to do with successful wintering. An excellent plan for ventilating is to have sliding ventilators in the doors, so that much or little air may be let in as desired. Also connect an extra stove pipe, provided with a damper, to the regular heating stove. This may be done by means of a T, or an extra flue will answer. Allow the pipe to extend into the cellar. This plan of ventilating has proved very successful.

III.—INSULATING HIVES FOR OUTSIDE WINTERING.

For this experiment, the hives were insulated against the winter cold by air cushions in the following manner. Slats 1 inch thick were nailed at intervals all around the hive, on these was tacked one layer of thick brown building paper and then a layer of oiled paper, which increases durability and also keeps out vermin. In order to provide extra protection to the hive, a box six inches wider and six inches longer was placed over this with an opening cut at the entrance, 1 inch by 2 inches, all other openings being closed. The wooden covers of each hive were removed and replaced with a chaff cushion 3 inches thick, the latter placed on the propolis quilt, and lapping over the sides of the hive; two layers of paper were then put on top of the cushion and a second cushion added, which had the top of the outside box over it. This experiment, first tried during the winter of 1902-3 with two hives, was repeated last winter for the second time with four colonies in Langstroth hives. These were all four placed in a large packing case, one foot larger each way than the hives, which were six inches apart in the case, with six inches of cut straw on the bottom of the case for the hives to rest upon. The six-inch space between the hives was packed with cut straw, as well as the one-foot space all around and on top of the hives. The entrances of two of the hives faced each other, and two hives faced west. The entrance to the hives was kept clear of snow all winter to ensure free ventilation. The hives were in a corner well sheltered from cold winds.

No sound could be heard from these colonies all winter. On March 22 the bees made their appearance, many flying briskly, going out and returning. From March 22 to April 22 the bees had but one good flight. On April 22 they were then examined. Very few dead bees were found on the bottom boards; the combs were dry and clean and there were no signs of dysentery. The hives were then removed from the packing case and placed on their summer stands. The average weight of the hives when put into winter quarters was 62½ pounds; when put on their summer stands, 49¼ pounds, showing that each hive had lost 13 pounds 4 ounces. The weather after this date (April 22) being bright and warm, the bees built up rapidly and were in excellent condition for the honey flow.

IV.—EXPERIMENTS TO DETERMINE WHICH BEES WOULD CONSUME MOST OF, HONEY OR SUGAR, WHILE CONFINED IN THEIR WINTER QUARTERS.

Eight colonies in Langstroth hives were selected for this experiment, all of as nearly equal strength as could be secured. On September 1 their natural stores were removed from both sets. On September 2 all were weighed as follows:—

(*a*.) The four colonies fed sugar syrup: No. 1 weighed 30 lbs. 7 oz.; No. 2, 31 lbs. 12 oz.; No. 3, 31 lbs. 10 oz.; No. 4, 31 lbs. 3 oz.; average of weight, 31 lbs. 4 oz.

(*b*.) The four colonies fed extracted honey: No. 1, weight, 30 lbs. 9 oz.; No. 2, 31 lbs. 10 oz.; No. 3, 30 lbs. 12 oz.; No. 4, 31 lbs. 1 oz.; or an average of 31 pounds.

Miller feeders were placed in empty section supers, close to the top of the brood frames, any part of the brood frames not covered by the feeder being covered by a propolis quilt cut so as to allow the bees a passage through it. By keeping the feeder well packed around, except where the bees enter, the heat is kept in and at the same time the bees cannot daub themselves with the liquid. In both experiments the bees had a constant supply of syrup and honey. Both the honey and the syrup were supplied to the bees at about blood heat. The syrup was made of the best granulated sugar, two parts to one of water by weight. The water was first brought to a boil, then the boiler was set back on the stove and the sugar having been poured in, the mixture was stirred until all was dissolved.

The four colonies fed sugar syrup when put into winter quarters November 24, weighed as follows:—

No. 1, 61 lbs. 4 oz.; No. 2, 62 lbs. 9 oz.; No. 3, 62 lbs. 7 oz.; No. 4, 62 lbs.; or an average of 62 lbs. 1 oz. each.

The four colonies fed extracted honey when put into winter quarters on November 24, weighed as follows:—

No. 1, 62 lbs. 13 oz.; No. 2, 62 lbs. 14 oz.; No. 3, 62 lbs.; No. 4, 62 lbs. 5 oz.; or an average of 62 lbs. 8 oz. each.

The four colonies fed sugar syrup when taken from their winter quarters March 22, weighed as follows:—

No. 1, 47 lbs. 3 oz.; No. 2, 49 lbs. 4 oz.; No. 3, 51 lbs. 5 oz.; No. 4, 51 lbs. 8 oz; average, 49 lbs. 13 oz.

The four colonies fed extracted honey when taken from their winter quarters March 22, weighed as follows:—

No. 1, 50 lbs. 9 oz.; No. 2, 53 lbs. 1 oz.; No. 3, 51 lbs. 12 oz.; No .4, 51 lbs. 2 oz.; average, 51 lbs. 10 oz. Difference in favour of the honey feeding, 1 lb. 13 ounces per colony.

When the hives were put into winter quarters and placed on the shelves in the cellar, the wooden covers were raised at one end ½ an inch, while the sealed propolis quilt was left undisturbed. The hives were all given extra ventilation at the bottom by placing at the entrance a wooden block between the bottom board and the brood chamber, thus raising the front of the brood chamber 3 inches extra. During the balance of November and December very slight humming could be heard; during January and February scarcely any appreciable hum could be heard. During the whole winter there was no sign of uneasiness of any kind, and very few dead bees were found about the entrance; the bottom boards were quite clean and there was no sign of dysentery in either experiment. All came out in first-class condition and built up rapidly for the honey flow.

V.—EXPERIMENT WITH QUEEN EXCLUDERS IN HIVES FOR THE PRODUCTION OF EXTRACTED HONEY.

Eight colonies were taken for this test—4 in Langstroth hives, 4 in Heddon hives.

Two colonies in each case had queen excluders between the brood chamber and the extracting frames; thus, every pound of honey secured was pure.

The two remaining colonies in each set had no queen excluders. The queen in every instance went up into the extracting frames where eggs were laid and young brood raised. This latter plan is practised by too many who call themselves bee-keepers. It is impossible to extract honey from frames where brood is present without throwing out the young larvæ at the same time. There are also many who do not use any surplus cases, especially those who use the old box hive. They take their honey out of the brood chamber after smoking or killing the bees. This

practice is to be strongly condemned, as the honey taken out of a brood chamber, or out of extracting frames where brood is present is not fit for human food.

On November 8, all colonies were weighed and found to be in good condition. They were then put into their winter quarters.

Introducing Queens.

Eight queens have been introduced during the season, four on the Benton plan and four with frames of brood taken from several hives. All queens belonging to the colonies that were to receive the imported queens, were removed 24 hours before introducing the new queens.

One method—'Benton introducing cage.'

The Benton mailing and introducing cage is ordinarily used in this country. It consists of an oblong block of wood with three holes bored nearly through, one of the end holes being filled with good candy, and the other two being left for the occupancy of the bees and queen. On the back of the cover are printed directions for introducing a new queen into a hive, and at each end of the cage is a small hole bored through the end of the block of wood, but which in the mails is stopped by a cork. One hole is for the admission of the bees and queen preparatory to mailing, and the other for the liberation of the queen, by the bees eating out the candy in the course of 20 to 30 hours, thus releasing her in a natural way. When the cage is received, the cork covering the candy is to be removed, as well as the wooden cover over the wire cloth. The cage is then carefully placed on top of the frames, so that the wire cloth be over the space between two frames in the centre of the brood-nest. The queen will then be released by the bees in the manner explained.

I would advise all to have extra cages for introducing, so that no disease may be brought in with the queen. See that the cage you introduce with is thoroughly cleaned, and have fresh food made from your own honey placed in the cage in readiness. Then remove the queen and bees from the cage they were received in, to the one prepared for them and follow the above directions.

How to Make Honey and Sugar Thick for Feeding.

Take good thick honey and heat (not boil) it until it becomes very thin, and then stir pulverized sugar into it. After stirring in all the sugar the honey will absorb, take the mixture out of the vessel, and thoroughly knead it with the hands. The kneading will make it more pliable and soft, so that it will absorb or take up more sugar. For summer use it should be worked, while mixing in a little more sugar, until the dough is so stiff as to be hard to work; it should then be allowed to stand for a day or two; and, if still so soft as to run, a little more sugar should be kneaded in. A good deal will depend upon the season of the year; there should be more sugar in proportion to the honey in warm weather than in cool weather.

Another method of introducing queens.

Select a strong colony, remove the wooden cover of the hive, and place a fine wire netting over the tops of the brood frames to shut in the bees; place on top of this wire cloth a brood chamber with four frames of well sealed brood, selected from different hives, with young bees just hatching out, but with no unsealed brood. Put the queen in this brood chamber, which should then be closed bee-tight, and kept over the strong colony four or five days. By that time a respectable force of young workers will have hatched; the hive may now be placed on the stand where it is to remain, the entrance being made large enough for only one bee to pass at a time, as a precaution aganist robbing. The entrance may be widened as the colony gets stronger. This latter plan has never failed with me.

John Fixter.

DIVISION OF BOTANY.

THE RUSTS OF GRAIN CROPS.

The losses from the attacks of different kinds of rusts on the cereal crops of the Dominion during 1904, were considerable, and have been reported from every part of the Dominion. In Manitoba and the North-west Territories rust on grain is very seldom heard of; but during the past autumn just about the time the grain was ripening the climatic conditions were such that rust developed to an alarming extent. The parasites which cause this disease are always present to a certain degree on grain crops as well as on several kinds of the wild prairie grasses, and this year they spread on the grain crops and were the cause in some places of great loss to farmers. There was so much interest created among settlers in the West that I was requested to prepare an article upon the subject for the Montreal *Family Herald and Weekly Star*, which was published in the issue of November 30 last. As it is of general interest and a great many inquiries have been made for a popular description of the disease and its cause, I reproduce the article herewith.

THE RUST OF WHEAT.

The subject of the rusts of grain crops is of special interest just now, owing to the unusual epidemic of these destructive parasites in the large wheat fields of parts of Manitoba and the eastern North-west Territories during the past season.

The loss from this cause was undoubtedly considerable; but there was no such wholesale or widespread destruction of the wheat crop in the prairie provinces, as was described in some United States and English newspapers. I have had opportunities of examining samples of rusted straw from many localities, which have been kindly sent in by Mr. David Horn, Chief Inspector of Grain, at Winnipeg, by the agricultural papers and by several correspondents. As a report on the whole of these samples, it may be said that, although some were seriously affected by rust, not one of them was as badly rusted as crops are frequently found to be in eastern Canada, which are nevertheless thought to be worth cutting for grain.

In passing through the Territories and Manitoba in the second week of August, although the crop was rather late and green, I saw no appearance of rust, nor did I hear any complaints of its occurrence at that time. The first reports were received about the 20th August. Early in September several items in the newspapers showed that there was much anxiety as to the extent of the loss which might occur. The localities where most harm was done, were in the Red River valley, in south-western Manitoba and in eastern Assiniboia. In the Regina district a few crops are said to have been so badly rusted that they were burned. The rust in these fields appears to have been noticed on the leaves and heads about the middle of August. On the 18th of that month there was a hailstorm, accompanied by rain; and immediately afterwards the rust spread rapidly.

In Manitoba, for fear of further injury, some crops of wheat were cut too green to be of use for grain, or were made into hay. Under the circumstances, and, as the season turned out, this was a wise course; for it has been found by Mr. Shutt, the Chemist of the Experimental Farms, that straw attacked by rust makes far better feed for stock even than clean straw, because the presence of the parasite causes the retention in the straw of the nutritious principles which after the seeds are formed are transferred from the straw into the grain.

THE EFFECT UPON THE WHEAT PLANT.

The physiological effect upon the wheat plant by the presence of the rust parasite is better understood by a consideration of the life history of the minute plants which are known as rusts. The term Rust, as applied to cereals, describes a disease due to the attacks of several different parasitic fungi belonging to the Uredineæ, a family which includes the most destructive parasites of cultivated and wild plants; and it must not be forgotten that rust is a plant, and, although so minute that a strong microscope is required to examine it, it is just as much a true plant with a definite life history of its own, as the wheat, oats, grasses, &c., upon which it grows.

The general belief that rust comes with rain, fog, or heavy dew after a hot day, is in the main correct; but the moisture and hot air are not actually the cause of the trouble; they merely act as the carriers of it and provide the conditions necessary for its injurious propagation.

The rust which was answerable for nearly all the injury in the West last season, was the Black Stem Rust. There are about a dozen different kinds of rusts which occur on wheat, oats and barley in this country. The commonest of these are the Orange Leaf Rust (*Puccinia rubigo-vera*) or Spring Rust, and the Black Stem Rust (*Puccinia graminis*), or Summer Rust, which attack all kinds of small grains, and the Crown Rust, or Orange Leaf Rust, of oats (*Puccinia coronata*), which does not occur on wheat or barley. Each of the first two named species has distinct specialized forms which attack wheat, oats and barley and some other grasses, but which very seldom infest plants belonging to other grains than those upon which they developed. For instance, spores of the Black Stem Rust of wheat will not produce readily on either barley or oats the corresponding rusts of those plants and *vice versa*. The two common rusts of wheat occur in all parts of the world, where that staple crop is grown; and in almost every instance it has been found that the Black Stem Rust is by far the more injurious of the two. The Orange Leaf Rust appears earlier in the season and is the more conspicuous; but the later-developed Black Stem Rust attacks its host in a much more vulnerable spot, namely on the stem, the channel up which the nutritious principles are carried from the vegetative system of the plant to be stored up in the seed. Developing on the stem, it arrests and feeds upon these important elements, thus causing starved and shrunken grain. The Orange Leaf Rust of oats is a different species from the Orange Leaf Rusts that occur on the other small grains; and like them has a red rust or spring form and a dark-coloured or summer form; but the Black Stem Rust of oats is merely a specialized form of the species (*Puccinia graminis*), which is also found on wheat, barley and rye, as well as on many different kinds of grasses.

THE GROWTH OF THE PARASITE.

In the case of the Black Stem Rust, the growth of the parasite is the same, whatever its host plant may be. It passes the winter in a resting condition on the old stems of the previous year. In the fields this will be chiefly on the stubble. The winter-spores or seed-bodies germinate early in spring and produce another kind of spores, which are exceedingly light, and are borne from place to place by the faintest breath of wind. These, alighting on the growing grain plants, produce, later, what is known as the red-rust or uredo stage of the fungus, to be followed in autumn by the resting winter-spores of Black Stem Rust. The sequence of this development is as follows: As soon as the minute spores of the first germination are carried on to a leaf of a growing plant, they germinate and throw out very slender tubes, which enter the tissues of the host plant in the same way that roots penetrate the soil. Here they feed at the expense of their host, and in time produce large numbers of reddish brown spores, which burst through the tissues and cause the red-rust stage, which again, later on in the season, is followed by the black-rust stage, which consists of the pro-

fuse production of another kind of spores, brownish black in colour. These are the teleutospores, and are the means of carrying the parasite over the winter. These black winter-spores frequently appear in this species in the same spots on the stem, where the red-rust stage was earlier in the season, but do not germinate until the following spring.

RUST AND THE BARBERRY.

In addition to these two forms of the Black Stem Rust, there is another stage which has been the subject of much controversy. This comes from the spores of the first generation in spring falling upon the leaves of some species of barberry, where they give rise to a curious fungus, known as Barberry Cluster-cup. After a time this matures and pours out enormous numbers of spores which are carried in all directions by the air and fall upon grain plants, where they give rise to Red Rust. Strange to say, this remarkable fact in the life history of rust was discovered very many years ago, and laws looking to the extermination of the barberry plant date back to 1660, when an Act having this object in view was passed in France.

It is not, however, absolutely necessary for Rust to have its first stage on the barberry, although experiments have shown beyond doubt that it does sometimes occur on that plant. The theory has been advanced that growing in this way in one of its stages on the barberry gives the parasite greater vigour; but it is beyond question that the Black Stem Rust can continue to grow in localities where no barberries are grown, and it is also known to occur in specialized forms on many of the wild prairie grasses. Among the samples of grasses sent to me from Manitoba with the rusted wheat, were specimens of the Skunk-tail grass, or Squirrel-tail (*Hordeum jubatum*), which bore well developed pustules of Black Stem Rust, similar to those which occur on wheat and cultivated barley. The Skunk-tail grass is a very bad weed of the West, and certainly increases in hay lands, owing to a habit farmers have of leaving this grass uncut when mowing, so that it ripens and distributes its seeds. If it were cut down at the same time as hay, the unripe seeds would soon dry up, or might be easily burnt after the hay was carried. Mr. Mark A. Carleton, Cerealist of the United States Bureau of Plant Industry, who has made extensive investigations of rusts, writes as follows:—

'It is positive now from experiments made by this department that the Rust of *Hordeum jubatum* will easily transfer to wheat and barley, and therefore it would decrease the chance of infection of a wheat field, if this grass could be kept out of the wheat, or if the wheat were sown away from its influence.'

REMEDIES.

Little can be done as a remedy against rusts; but, as the parasite passes the winter on the old straw, land left for seeding on stubble should be burnt over carefully before seeding, and the ploughing down of stubbles for summer-fallow should be done as early as possible in the season, so as to prevent as much as may be the distribution of the first generation of spores. Rusted straw fed to cattle is said to distribute the fungus in grain crops from the spores being carried through with the manure. Fresh manure, therefore, should not be used in fields where grain is to be grown. The investigations which have been carried on in Australia, have run largely towards the discovery of varieties of grain which may be more or less exempt from the attacks of rust. Although probably no variety has yet been found entirely free from these parasites, still much has been learned as to the comparative immunity of some kinds, and Mr. Carleton points out that the investigations are said incidentally to have resulted in Australia now having varieties of wheat which are vigorous, true to name, and of exceptional quality for the particular region in which they are grown.

Ever since the institution of the Experimental Farms, much attention has been paid in our experiments with cereals to the problem of rust-resistance. Seed grain has been obtained from all parts of the world. The Australian and many other varieties said to be of special quality have been secured and experimented with, with a view to ascertaining the rust-resisting power of each. A vast amount of useful information will be found by looking through the annual reports of the Experimental Farms, where in the tables of yields of varieties, a special column is devoted each year to the amount of injury by rust on every variety of wheat and oats grown at the different Branch Farms. The result of these experiments, as stated above, is that no variety of wheat or oats, so far, has been found which is perfectly free from rust, although by constant selection those varieties are being separated, which have the greatest power to resist the attack of the parasites.

It may be mentioned here that up to the present time experiments in spraying grain fields with Bordeaux mixture and other fungicides for the prevention of rust have not been attended with any success.

ENCOURAGING FEATURES.

There are some features of the rust epidemic of 1904 which may well be borne in mind by western farmers.

1. The extent of injury this year was much influenced by the unusual season, owing to which all crops were later than usual. The spring was late, cool and dry, followed by hot weather, which suddenly changed at harvest time to dull, wet weather of long duration. The result of these conditions was that, at the time when wheat and oats should have been ready to cut, which was the exact time when the rust appeared this year, not only were grain crops in an exceptionally late and succulent state, but the atmospheric conditions, which were very unusual for the region, were just such as would allow of the rapid development of parasitic fungi.

2. Such an extensive outbreak of rust is without any precedent in the history of the Canadian West.

3. As in ordinary seasons rust has been almost unknown in the West, such extensive injury as was experienced in 1904, must be considered as exceptional and not likely to occur again for many years.

J. FLETCHER.

PERMANENT PASTURES.

The following table gives the yields from the permanent pasture experimental plots for the past four years:—

Number.	Seed sown per Acre. Mixtures Nos. 1-17, sown May 4, 1901. Sainfoin, No. 18, sown May 1, 1903.		Cured Hay, per Acre.							
			1904.				Total.			
	Grasses.	Clovers.	June 24.		August 12.		1904.		1903.	1902.
	Lbs.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
1	Timothy..... 6 Meadow Fescue.... 4 Orchard Grass..... 2 Kentucky Blue .... 1 Red Top 1	Alfalfa..... 2 Alsike ..... 2 Mammoth Red ... 1 Common Red..... 1 White Dutch..... 2	3	880	2	3	5	883	4 520	4 40
2	Meadow Fescue.... 6 Timothy ..... 3 Canadian Blue..... 2 Orchard Grass..... 3 Red Top..... 3	Alfalfa..... 4 Alsike ..... 1 White Dutch..... 1	3	960	2	101	5	1,061	3 1,560	4 660
3	Timothy ..... 5 Awnless Brome.... 4 Orchard Grass..... 2	Alfalfa ..... 6 Alsike 3	3	1,021	1	1,320	5	341	4 770	5 120
4	Meadow Fescue.... 6 Orchard Grass..... 2 Kentucky Blue 1	Common Red..... 4 Alfalfa ..... 3 White Dutch..... 1	3	1,079	1	1,381	5	460	4 320	5 1,520
5	Timothy..... 6 Upright Brome.... 4	Alfalfa..... 6 Mammoth Red.... 4	3	1,282	1	1,339	5	621	4 840	4 960
6	Timothy..... 10	Common Red. ... 6	3	880	1	840	4	1,720	2 880	4 760
7	Timothy..... 10	Mammoth Red.... 6	3	120	1	520	4	640	1 1,520	3 1,200
8	Orchard Grass..... 18	Alsike 5	1	1,680		1,892	2	1,572	2 80	2 1,200
9	Orchard Grass..... 18	Common Red. ... 8	2	360	1	160	3	520	2 1,600	3 1,280
10	Meadow Fescue ... 20	Common Red..... 8	2	240		1,997	3	237	2 680	3 40
11	Timothy..... 12	Mammoth Red.... 8	2	1,980		1,942	3	1,922	2 1,400	3 1,760
12	Timothy..... 12	Common Red. ... 8	3	320	1	70	4	390	2 1,920	3 20
13	Timothy..... 5 Awnless Brome.... 10	Common Red..... 5 Mammoth Red.... 5	2	1,840	1	1,240	3	1,080	2 1,840	4 300
14	Awnless Brome.... 25	.....	1	1,881		840	2	721	1 1,360	3 1,020
15	Awnless Brome..... 15	Common Red..... 8	2	1,889	1	320	4	209	3 360	4 760
16	Timothy..... 8	Mammoth Red ... 8	3	1,652	1	129	4	1,781	3 1,160	3 340
17	....	Sainfoin 40	3	1,998	2	1,400	6	1,398	4 1,160	3 1,160
18	.....	Alfalfa..... 15	2	840	1	837	3	1,677		

REPORT OF THE EXPERIMENTALIST.

(Chas. E. Saunders, B.A., Ph.D.)

Dr. Wm. Saunders,
Director Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit herewith, the second annual report of the Division of Cereal Breeding and Experimentation.

The cross-fertilising and the selecting of desirable types among cereals occupied much time during the early summer; and, the comparative study of the different varieties of cereals, field roots, &c., as they reached maturity, was the chief work of the later part of the season.

Some attention was also given, during your absence on your annual visit to the branch farms, to the new varieties of hardy, hybrid crab-apples which are being produced for the northern parts of the Dominion.

Good progress has been made during the year in the enlargement of the museum collection of cereals, which is proving of great value.

In the month of December, 1903, I attended the first meeting of the American Breeders' Association at St. Louis, where I presented a paper entitled: 'Some Observations on Heredity in Wheat.'

On the same trip, visits were paid to some of the wheat-testing laboratories in Chicago, Minneapolis and Brookings (South Dakota). Much kindness was received from Prof. Jas. H. Shepard of the South Dakota Experiment Station, who explained in detail the methods used by him in his studies on the milling qualities of the macaroni wheats.

During the winter, much time was spent in the careful study of a large number of selected heads of wheat and other grains for the purpose of starting improved strains of some of the most important varieties. Hand selection of threshed grain from the plots of some of the best sorts of wheat, in order to eliminate certain undesirable types of seed, has also been carried on; while the whole of the grain for the experimental plots was, as usual, carefully hand picked before being sown.

The purchase of a roller-process flour mill for the grinding of small quantities of wheat has enabled me to commence an investigation into the quality of Canadian wheats.

I am much indebted to Mr. George Fixter, for his valuable work as foreman in charge of the experimental plots, and to Miss M. Hager, for the great care with which she performed the work of seed selection in the difficult cases which were entrusted to her.

I am indebted also to Professor C. A. Zavitz, of Guelph, for seed of a strain of Early Yellow Soja beans, to Professor J. H. Shepard of Brookings, for an excellent sample of macaroni made at the South Dakota Experiment Station, to the Sheffield-King Milling Company of Faribault, Minn., for a large sample of patent flour made from macaroni wheat (which proved very good for bread making), to the Lake of the Woods Milling Company and to the Ogilvie Flour Mills Company for fine samples of the products of their mills, to the United States Department of Agriculture for some new varieties of barley, to Mr. C. Boije of Finland, for new sorts of oats, and to Mr.

A. McMullen of the Guinness Laboratories, Dublin, for some extremely interesting samples of Irish barley.

I have the honour to be, sir,
Your obedient servant,

CHARLES E. SAUNDERS,
Experimentalist.

CROSSING OF CEREALS.

Owing to the fact that so many cross-fertilised seeds were obtained in 1903, it was not deemed desirable to devote quite so much attention to this part of the work this year. A smaller number of crosses was therefore attempted, but most of these were of unusual interest. The results were quite satisfactory. The work of cross-fertilising was begun on June 20 and continued until July 6. Eleven different crosses were accomplished in wheat, giving 85 seeds, four in barley giving 28 seeds, and one in oats giving one seed. Some mixed crosses (wheat with barley) were also attempted but the seeds obtained were not plump and may not germinate when planted.

The cross-fertilised seed produced in 1903 was sown on April 25. In no case were the seeds put in closer than 4 inches apart each way. This allowed space for the study of each plant by itself. The oats, barley and peas were sown at greater distances apart. Most of the seed germinated well. The following figures give the number of plants harvested: Peas, 20; wheat and emmer, 416; barley, 18; oats, 4. This makes a total of 458 new varieties of grain. Most of these made very strong growth, many of the plants of wheat attaining a height of nearly five feet. The unusual severity of rust, however, very materially reduced the yield of grain. Nevertheless, if the seed germinates well next season, it should give several thousand new varieties; for experience has shown that every seed from an original cross-bred plant produces a new variety of grain.

SELECTION OF PROMISING TYPES OF CEREALS.

The selection of the most promising types from mixed seed found in commerce and from the newer cross-bred sorts produced at this Farm was continued this year with unusual care. Altogether nearly 300 selected strains were sown, and of these about 290 were harvested, a number of them having been rejected during the growing season on account of their lateness or for some other cause. Among these new strains are several very promising types, which are sufficiently distinct to be ranked as new varieties. The best of these will be brought into the uniform test plots as soon as possible.

The cross-bred varieties of wheat described in the report for last year (Preston, Stanley, Huron, Percy and Laurel) were subjected to very careful re-selection, sufficient seed being obtained in each case to sow the one-fortieth acre plot. This has now given a small stock of grain, greatly improved in character, to serve as the foundation for improved strains of these varieties. Early Riga, Downy Riga, Riga and Bishop were also re-selected in a similar manner. White Fife, a variety seldom met with in a condition at all approaching purity, was also treated in the same way.

RUST-RESISTING VARIETIES.

Rust in cereals has attracted more than the usual amount of attention during the past season, the damage from this disease having been greater in some sections of the

country than is generally the case. It seems desirable, therefore, to call attention to the efforts which have been and are being made at the Dominion Experimental Farms to discover rust-resisting varieties of cereals. For many years careful notes have been made at the Experimental Farms on the extent to which each variety of grain has suffered; and this information has been published in the tables in the annual reports. Many new sorts of cereals (especially wheat) have been obtained from Europe, Asia, Northern Africa, the United States and Australia in the search for rust-resisting sorts. In addition to these, many cross-bred varieties have been produced at this farm (by crossing ordinary wheats with macaroni wheats and wheats with emmers) in the hope of obtaining exceptionally strong types. A careful study of single plants of certain varieties is also being carried on, to see whether individuals can be found to be used as the mother plants of rust-resisting strains.

These lines of investigation have not yet been followed long enough to reach very striking results, but the work is being continued on a larger scale than before.

DESCRIPTION OF CROSS-BRED VARIETIES OF WHEAT.

The following new varieties of wheat produced at this farm are here described for the first time. They are all being propogated as rapidly as possible, but are not yet available for general distribution. It should be noticed that Early Riga, Downy Riga, Riga and Bishop are valuable chiefly on account of their earliness. They are not recommended for cultivation in districts where the ripening season is long.

The measurements given in the descriptions apply to the grain as grown at Ottawa.

Early Riga.—Parentage, Gehun (female) crossed with Onega (male). Kernels red, rather small. Heads beardless, rather small, usually about 3 inches long. Chaff yellowish, smooth and downy mixed. Straw stiff, but not above medium height, usually about 42 inches long. Ripens very early, about 12 days before Red Fife. Gives a rather small yield, especially in seasons when rust is unusually severe. Makes excellent flour.

As this variety is a mixture of two distinct types, easily distinguished by the hairiness or smoothness of the chaff, it has been separated into the two varieties described below.

Downy Riga.—Obtained from Early Riga by selection of the heads having downy chaff.

Riga.—Obtained from Early Riga by selection of the heads having smooth chaff.

Bishop.—Parentage, Ladoga (female) crossed with Gehun (male). Kernels yellowish, of about medium size. Heads beardless, usually about 3½ inches long, rather blunt. Chaff yellowish, smooth. Straw moderately stiff, usually about 43 inches long. Ripens quite early, about 8 days before Red Fife. Gives a fair yield. Makes very good flour. This variety resembles White Fife in some respects, but is distinguished by its rather blunt head, its much greater earliness and its somewhat smaller yield. (White Fife usually ripens with Red Fife).

Red Preston.—The original Preston wheat gave two types of heads, some having yellowish chaff and others red chaff. The name Preston is now being used to designate only the type with yellowish chaff, as described in the Report of the Experimental Farms for 1903, page 219. The name Red Preston is given to the type having red chaff. In other respects Red Preston resembles Preston.

DOUBLE ROWS AND OTHER SMALL PLOTS OF CEREALS.

Well-known varieties of cereals which have been rejected from the uniform test plots as undesirable for general cultivation are retained for reference purposes and are grown annually in the double rows. These rows are 33 feet long and about 6 inches apart; and each pair of rows is separated from the neighbouring pairs by a space of

about 2 feet. In these double rows are also sown all the new varieties of grain, of which there is only a very small quantity of seed on hand. When a larger amount of seed is available a small plot is sown, but the yield per acre is not usually estimated when the plot is less than one-fortieth of an acre in extent.

An alphabetical list of the principal varieties grown in the double rows and other small plots, during the past season, is here given. The total number of these was 157. Those sorts which are given under letters and numbers are new varieties produced at this farm, but not yet named.

Spring Wheat.

6 E 2 (Red Fife × Polish).
6 E " "
6 T " "
7 D (Red Fife × Roumanian).
7 E " "
8 C (Red Fife × Goose).
8 E " "
8 H 1 " "
9 A 1 (Common Emmer × Colorado Wheat).
9 D 1 " "
9 D 2 " "
9 G " "
9 H 1 " "
9 K 2 " "
10 C (Colorado Wheat × Common Emmer).
10 F " "
Alpha.
Fanat.
Bearded March.
Beaudry.
Campbell's White Chaff.
Cape.
Cartier.
Cassel.
Chiddam March.
Club.
Crown.
Early Sonora.
Galician.
Gurke.
Herisson Beardless.
Hungarian Mountain.
Hungarian Red.
Hungarian White.
Japanese.
Japhet.
Ladoga.
Naples.
Norval.
Persian Black.
Pringle's Defiance.
Progress.
Red Bearded.
Red Preston.
Red Swedish.
Rideau.
Robin's Rust Proof.
Rye Wheat.
Sicilian.
Strubes.
Summer Cob.
Touzelle.
Victoria.

Macaroni or Durum Wheat.

Adjini Red.
Adjini Yellow.
Arneutka.
Italian.
Madonna.
Mahmoudi Red.
Mahmoudi Yellow.
Mishriki.
Polish.
Red Indian.
Sleaford.
Sorentino.

Emmer and Spelt.

Black Bearded Spelt.
Double Emmer.

Oats.

Abyssinia.
Aitken Black.
Australian.
Bayonet.
Bergs (black).
Beseler.
Black Mesdag.
Bonanza.
Brandon White.
Brandon Yellow.
Brown Algerian.
California Prolific (black).
Clydesdale.
Cream Egyptian.
Cromwell.
Dinauer.
Doncaster Prize.
Early Archangel.
Early Blossom.
Early Gothland.
Early Maine.
Eureka.
Fichtel Mountain.
Flying Scotchman.
Holland.
King.
Leutenwitzer.
Liberty.
Miller.
Newmarket.
New Zealand.
Norwegian Black.
Oderbruch.
Prince Royal.
Rennie's Prize White.
Russell.
Salines.
Scarboro.
Scottish Chief.
Selchower.
Sheffield Standard.
Tobolsk.
Tunis (brown).
Victoria Prize.
White Russian.
White Schonen.
White Wonder.
Zhelannii.

Six-row Barley.

Blue Short Head.
Excelsior.
Foyston.
Hulless White (beardless).
Petschora.
Phœnix.
Small Blue Naked.
Success (beardless).
Surprise.
Vanguard.

Two-row Barley.

Black Two-row.	Improved Thanet.	Nepean.
Duckbill.	Italian.	Prize Prolific.
Erfurt White.	Jewel.	Rigid.
Gambrinus.	Kinver Chevalier.	Triple Naked (beardless).
Hoffman.	Large Naked.	Victor.

Peas.

Alma.	Elephant Blue.	New Potter.
Bright.	Fergus.	Norwegian Grey.
Bruce.	French Canner.	Oddfellow.
Centennial.	Harrison's Glory.	Perth.
Creeper.	Maple.	Trilby.
Elder.	Multiplier.	

UNIFORM TEST PLOTS OF CEREALS, FIELD ROOTS AND FODDER CORN.

The standard and new varieties of cereals which are obtainable commercially are annually grown in plots of one-fortieth of an acre, along with the cross-bred sorts produced at the Farms and a number of other varieties obtained from various sources. The field roots and fodder corn are grown in similar plots, and the yield per acre is estimated from the crop obtained from two rows, each 66 feet long. The object of these tests is to determine the relative productiveness, earliness, &c., of the different varieties. Those which for a series of years are found to be distinctly inferior are rejected, and strong efforts are made to keep the list within as small bounds as possible without omitting anything which may ultimately prove of value.

The number of these larger plots grown during the past season was as follows:—Spring wheat, 98; macaroni wheat, 14; winter wheat, 20; emmer and spelt, 11; oats, 89; six-row barley, 47; two-row barley, 28; winter barley, 1; peas, 34; spring rye, 1; winter rye, 4; soja beans, 3; horse beans, 2; field beans, 4; flax, 7; turnips, 40; mangels, 32; carrots, 20; sugar beets, 16; Indian corn, 50; mixed grain, 8; making a total of 520 plots. These represent about 410 varieties, duplicate plots being necessary, for special reasons, in some cases.

Some of the varieties mentioned in the Report of the Experimental Farms for 1903, have been discontinued on account of lateness, small yield, or for other defects.

PREPARATION OF LAND FOR THE UNIFORM TEST PLOTS.

The system of cultivation adopted for the land devoted to the experimental plots is necessarily somewhat different from that which is generally considered advisable in ordinary farming; but it is worthy of mention that abnormally large quantities of fertilising material are not employed. The land used for the plots consists of three separate fields, and a three-year rotation is practised. Each field receives every third year a dressing of fresh barn-yard manure. This has been applied in the past at the rate of only twelve tons per acre, but this amount has been found insufficient whenever the manure has not been of the highest strength. The quantity is therefore being increased to 18 tons per acre. This is at the rate of 6 tons per acre for each year. While this is a somewhat larger quantity of barn-yard manure than is used in ordinary farming, it must be remembered that there is no opportunity in this case for the ploughing under of sod or for allowing the land to be used sometimes for pasturage, as is the common practice. For these reasons it seems necessary to apply the manure in somewhat greater quantities than usual, though it cannot be fairly claimed that the land is unduly enriched by this method. The manure is spread on the ground and ploughed under in spring. This field is then used for roots, fodder corn and other hoed crops. In the autumn, after the harvest is over, the land is ploughed about seven inches deep, and is left in that condition until the following spring, when it is cultivated twice with a two-horse cultivator and harrowed twice with a smoothing harrow. Cereals are then sown. After the grain is harvested the land is ploughed about three or four inches deep, to start the shed grain and any weed seeds present, and is again

ploughed a few weeks later about seven inches deep. In the following spring it is prepared as before and cereals are again sown. It is not, however, the practice to sow the same cereal twice in succession on the same piece of land.

SELECTION OF SEED FOR UNIFORM TEST PLOTS.

In order to obtain the seed for the uniform test plats in the best condition, and as nearly as possible in a state of absolute purity, selected heads are gathered by hand from each plot just before the grain is cut. About eight pounds of heads are harvested in this way. During the winter these selected samples are carefully threshed and cleaned by hand; and the grain to be sown the next season is thus brought to a very high standard of purity. This method has been used for several years with wheat and barley; and is being continued with these grains. In oats, however, the selection of heads is not usually carried out unless the grain in the plot shows signs of being mixed. It is much more difficult to select the heads of oats; and the plots are always injured more or less while the work is being done, on account of the growth of the oats being very thick.

In all cases, when the seed for the plots is not obtained by hand selection in the field, the crop from the plot is thoroughly screened and carefully hand-picked before being sown the next season.

WEATHER.

Spring opened late, but the rather unusually cool weather during the month of May gave ample opportunity for the root growth of cereals wherever the seed had germinated well. On some soils, however, the crops made poor progress during this month. June and July were favourable months, but August and September were wet and rather cold. On the whole the season was a good one, except for the unusual severity of rust on cereals. Late-maturing varieties and all plots sown rather late suffered most, wheat being in some cases badly shrivelled in consequence.

SPRING WHEAT.

The following varieties of spring wheat were added to the plots this season :—

Riga.—See 'Description of Cross-bred Varieties of Wheat.'

Downy Riga.—See 'Description of Cross-Bred Varieties of Wheat.'

Pearl.—This is a beardless wheat with large, round, red kernels. It was obtained from Sweden. It proved late in ripening and suffered severely from rust.

Saumur.—Obtained from France under the name of *Saumur de Mars*. The kernels of the imported grain were rather large, red and soft. It gave a very poor yield this season.

Two other sorts, *Pithiviers* and *Red Prolific*, obtained from France, proved entirely unsuited to our conditions.

Several varieties have been dropped from the uniform plots this year. Only one of these, however, is of importance : the variety known as White Connell. A careful study showed that White Connell is an impure strain of White Fife. It was, therefore, rejected.

All kinds of wheat were affected by rust this season, but the injury was most severe in the case of those varieties which were late in ripening, whether the lateness was due to a delay in sowing or to the habits of the varieties. The results this year serve to emphasise most strongly the importance of early sowing for wheat.

The sowing of the wheat plots was begun on April 27, but owing to unfavourable weather, was not completed until May 2.

All the plots were one-fortieth of an acre, except in the case of Pearl, where the amount of seed on hand was only sufficient for one-eightieth of an acre.

The seed was used at the rate of 1½ bushels to the acre.

The yield per acre is expressed in 'bushels' of 60 pounds.

SPRING WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days maturing.	Length of Straw, including Head.	Character of Straw.	Length of Head.	Yield per Acre.	Weight per measured bushel after cleaning.	Rusted.
				Inches.		Inches.	Bush. Lbs.	Lbs.	
1	Byron*	Aug. 1	96	39 to 41	Stiff	3¾ to 4½	27 20	63	Badly.
2	Australian No. 28	" 10	100	44 " 46	"	3½ " 4½	27 20	60	"
3	Newdale*	" 3	93	45 " 47	"	3½ " 4	26 20	61	Slightly.
4	Weldon*	" 9	99	44 " 46	"	3½ " 4	26 20	59½	Badly.
5	Australian No. 21	" 10	100	43 " 45	"	3½ " 4½	25 40	60½	"
6	Hastings*	" 2	97	42 " 44	"	3 " 3½	25 20	62	"
7	Admiral*	" 5	95	41 " 43	"	3½ " 4	25 ..	61½	"
8	Spence*	" 4	94	47 " 49	"	3½ " 4	24 40	63½	"
9	Bishop*	" 1	91	36 " 38	"	3 " 3½	24 40	62½	Slightly.
10	Chester*	" 3	93	39 " 41	"	3½ " 4	24 40	61½	Considerably.
11	Australian No. 12	" 9	99	45 " 47	"	3½ " 4	24 20	61½	Badly.
12	Benton*	" 4	99	43 " 45	"	3¾ " 4½	23 40	60½	"
13	Advance*	" 4	99	40 " 42	"	3½ " 4½	23 40	61½	Considerably.
14	Redpath*	" 9	99	48 " 50	"	3½ " 4½	23 40	59	Badly.
15	Nixon*	" 4	99	42 " 44	"	3½ " 3¾	23 20	60	Considerably.
16	Herisson Bearded	" 4	99	39 " 41	"	1½ " 2½	23 ..	63½	Badly.
17	Orleans*	" 4	99	44 " 46	"	3½ " 4½	23 ..	60½	Considerably.
18	Plumper*	" 3	93	39 " 41	"	3½ " 4½	23 ..	63½	Badly.
19	Red Fern	" 8	98	43 " 45	"	3½ " 4½	22 40	61½	"
20	Dawson*	" 9	99	48 " 50	"	3½ " 4½	22 20	59½	"
21	Preston*	" 2	97	38 " 40	"	3¼ " 4	21 20	61½	Considerably
22	Laurel*	" 8	98	42 " 44	"	3¼ " 4	21 20	56½	Badly.
23	Clyde*	" 8	98	41 " 43	"	3½ " 4½	21 ..	60	"
24	Crawford*	" 2	92	38 " 40	"	3½ " 4	20 20	61½	Slightly.
25	Countess*	" 3	93	44 " 46	"	3¼ " 4	19 40	61¼	Badly.
26	Colorado	" 3	93	42 " 44	"	3 " 3½	19 40	62	Considerably.
27	Ebert*	July 28	92	38 " 40	"	3¼ " 3½	19 20	62	"
28	Pringle's Champlain	Aug. 3	98	38 " 40	"	3½ " 4½	19 ..	61	Badly.
29	Dayton*	July 30	94	40 " 42	"	3 " 3½	19 ..	61¼	"
30	Monarch	Aug. 8	103	38 " 40	"	3½ " 4	18 40	60	Considerably.
31	Dawn*	" 4	99	42 " 44	"	3½ " 4¼	18 20	59½	"
32	Percy*	" 2	97	36 " 38	"	3 " 3½	18 ..	61	"
33	White Fife	" 9	99	40 " 42	"	3¼ " 4	18 ..	60	Badly.
34	Downy Riga*	July 28	92	39 " 41	"	2½ " 3½	18 ..	60	"
35	Gehun	July 29	93	40 " 42	Medium	2½ " 3¼	17 40	60	Considerably.
36	White Russian	Aug. 8	103	40 " 42	Stiff	3½ " 4	17 .	60	Badly.
37	Early Riga*	July 28	92	39 " 41	"	2½ " 3½	17 ..	60	"
38	Stanley*	Aug. 2	97	36 " 38	"	3 " 2½	16 40	58½	Considerably.
39	Fraser*	July 29	93	35 " 37	Medium	2¾ " 3½	16 40	60½	"
40	McKendry's Fife (Minn. 181)	Aug. 9	99	42 " 44	Stiff	3½ " 4½	16 40	59	Badly.
41	Australian No. 19	" 9	99	35 " 37	"	2½ " 3½	16 40	60½	"
42	Rio Grande	" 7	97	46 " 48	"	4½ " 5	16 20	59½	"
43	Power's Fife (Minn. 149)	" 9	99	37 " 39	"	3 " 3½	16 20	61	"
44	Minnesota No. 163	" 11	101	43 " 45	"	3½ " 4½	15 40	58½	"
45	Australian No. 15	" 10	100	33 " 35	"	3½ " 3½	15 40	60½	"
46	Riga*	" 1	96	37 " 39	"	2½ " 3½	15 20	60	Considerably.
47	Australian F	" 8	98	36 " 38	"	3½ " 4	15 20	59½	Badly.
48	Red Fife	" 8	103	37 " 39	"	3½ " 4	15 ..	60	"
49	Harold*	July 28	92	37 " 39	"	2½ " 3½	15 ..	60	"
50	Marvel	Aug. 3	93	39 " 41	"	3½ " 4	14 40	59	Considerably.
51	Wellman's Fife	" 8	103	40 " 42	"	3½ " 4	14 20	56½	Badly.
52	Blue Stem	" 13	103	46 " 48	"	3½ " 4½	14 20	57½	"
53	Hungarian	" 7	102	37 " 39	Medium	3 " 3½	14 .	61	"
54	Pearl	" 17	107	48 " 50	Stiff	3½ " 4½	13 20	55	"
55	Tracey*	" 9	104	40 " 42	"	3½ " 4½	12 40	58	Considerably.
56	Haynes' Blue Stem (Minn. 169)	" 13	103	46 " 48	"	3½ " 4	12 40	58½	Badly.
57	Huron*	" 4	99	36 " 38	"	3½ " 4	12 20	59½	"
58	Saumur	" 11	101	31 " 33	"	2½ " 3	12 20	55	"
59	Australian No. 9	" 7	97	36 " 38	"	3¼ " 4	11 20	56½	"

* Cross-bred varieties produced at the Experimental Farms are marked with an asterisk.

Most Productive Varieties of Spring Wheat.—Excluding the macaroni wheats, which are considered separately, the most productive varieties of spring wheat at this Farm for the last five years have been Preston, Huron, Herisson Bearded and Pringle's Champlain. These are all bearded varieties. Preston, Huron and Pringle's Champlain are of good quality for milling purposes.

The most productive beardless variety, during the last five years, has been White Fife. Red Fife (beardless) and Red Fern (bearded) have also given very good yields; while White Russian (beardless), Laurel (beardless), and Wellman's Fife (beardless) have proved almost equally productive.

Earliest Varieties of Spring Wheat.—The earliest varieties of spring wheat grown in the plots on this Farm are Harold, Ebert, Fraser, Gehun, Early Riga, Riga and Downy Riga. These sorts are not yet available for general distribution, but the best of them will be introduced as soon as possible.

Preston, Stanley and Percy are the earliest kinds which are now being sent out from the Experimental Farms. They ripen at Ottawa about six days before Red Fife.

MACARONI OR DURUM WHEAT.

The term "macaroni" wheat is generally employed to designate those extremely hard varieties with large kernels of which 'Goose' or 'Wild Goose' is the best-known example in Canada. The different sorts of macaroni wheat are by no means identical in quality, but for commercial purposes they are generally considered as practically the same.

They are looked upon with disfavour by millers; and farmers who grow any wheat of this class should exercise great care to prevent it from becoming mixed with wheat which is to be sold for flour-making.

As a rule, these wheats suffer less from drought and from rust than other sorts. They may, therefore, in some cases, be grown to advantage, especially in rather dry districts where rust is apt to be severe. Though these varieties were attacked by rust during the past season at this Farm, it will be noticed that the evil effects of the disease were not nearly so marked as in the case of spring wheats of the ordinary type, the macaroni wheats being higher in yield and in weight per bushel. They are not, however, to be generally recommended for damp climates. It should also be borne in mind that the market price of macaroni wheat is generally lower than that paid for varieties of wheat which are popular for milling purposes.

The plots of macaroni wheat were one-fortieth of an acre in extent. The seed was sown on May 2 at the rate of 1½ bushels to the acre.

The yield per acre is expressed in 'bushels' of 60 pounds.

Bishop. Riga. Downy Riga.

The photographs show the actual sizes of the heads.

MACARONI WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days maturing.	Length of Straw, including Head.	Character of Straw.	Length of Head.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
				Inches.		Inches.	Bush.	Lbs.	Lbs.	
1	Roumanian	Aug. 18	108	50 to 52	Stiff	2½ to 3	39	40	63	Considerably.
2	Velvet Don	" 11	101	45 " 47	Medium	2½ " 3	36	20	63½	"
3	Goose	" 10	100	48 " 50	"	2¾ " 2¾	35	20	63¾	"
4	Gharnovka	" 15	105	48 " 50	Stiff	2¾ " 3¼	35	..	62½	"
5	Black Don	" 10	100	45 " 47	"	2¼ " 2¾	33	..	63	Badly.
6	Yellow Gharnovka	" 15	105	53 " 55	"	2½ " 3	31	20	63	Considerably.
7	Kubanka	" 9	99	49 " 51	Medium	2½ " 3	30	20	63½	"
8	Kahla	" 14	104	41 " 43	"	2 " 2¾	26	20	60½	"
9	Mahmoudi	" 17	105	46 " 48	Stiff	2½ " 3	26	..	59	Badly.
10	Medeah	" 9	99	48 " 50	"	2½ " 3	24	20	59½	Considerably.
11	Beloturka	" 11	101	39 " 41	"	2¾ " 2¾	24	..	64	"

These varieties of macaroni wheat have not been grown long enough to permit the drawing of definite conclusions as to their relative yield and earliness through a series of years. Roumanian can, however, be recommended for its large yield.

POLISH OR CORN WHEAT.

Much attention has lately been given by the public to a variety of macaroni wheat called 'Polish' or 'Polonian' or 'Corn Wheat' or 'Giant Rye.' This wheat is characterized by extremely large, bearded heads and long yellowish kernels, and is altogether very striking in appearance. It has, however, been rejected from the larger test plots at this Farm on account of its uniformly very small yield, and its great susceptibility to rust. During the four years ending in 1903 the following average yields were given by Polish, Goose, Red Fife and Preston wheats :—

	Yield per Acre. Bush.	Lbs.
Polish	13	33
Goose	27	3
Red Fife	31	23
Preston	33	55

WINTER WHEAT.

Several varieties of winter wheat which had not previously been tested at this Farm were added to the uniform plots this year. They were all obtained from seedsmen in America (chiefly in Ontario), except the two Russian sorts, Kharkov and Padi, which were kindly furnished by the Department of Agriculture of the United States.

Kharkov (Washington, No. 7786).—This is a bearded variety with rather small heads and with smooth, yellowish chaff. The kernels are red, rather small and unusually hard for winter wheat. This is a very promising variety for flour-making.

Padi (Washington, No. 9129).—This resembles Kharkov in almost every respect except that the heads are beardless.

Abundance, American Banner, Red Chief, Early Windsor, Invincible and *Prosperity* are beardless varieties; and *Silver Sheaf* is a bearded sort.

The plots of winter wheat were sown on September 10, 1903. All the plots were one-fortieth of an acre, and the seed was used at the rate of 1¾ bushels to the acre.

When winter set in the plots were looking well, but when growth commenced in spring many of the plots were thin or bare in some spots owing to winter-killing. In

most cases, therefore, it was deemed advisable to estimate the yield of grain from one-eightieth of an acre only.

The yield per acre is expressed in 'bushels' of 60 pounds.

WINTER WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days maturing.	Length of Straw, includ'g Head	Character of Straw.	Length of Head.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
				Inches.		Inches.	Bush.	Lbs.	Lbs.	
1	Red Velvet Chaff	July 23	317	55 to 57	Medium	3-3¾	40	40	61½	Considerably.
2	Turkey Red	" 20	314	50 " 52	Weak	2¾-3¼	39	20	61	"
3	Abundance	" 21	315	47 " 49	Stiff	3½-4	39	20	61	"
4	American Banner	" 22	316	56 " 58	"	3¼-3¾	38	40	61	"
5	Kharkov	" 20	314	46 " 48	Weak	2-2½	38	..	61½	Slightly.
6	Imperial Amber	" 23	317	50 " 52	"	3¼-3¾	37	20	58¼	Badly.
	Red Chief	" 23	317	54 " 56	Stiff	3-3½	36	..	60¼	Slightly.
8	Early Windsor	" 27	321	55 " 57	"	3-3¾	34	40	58½	Badly.
9	Reliable	" 22	316	48 " 50	"	3½-4¼	32	..	63¼	Slightly.
10	Silver Sheaf	" 20	314	55 " 57	Medium	3¼-3¾	30	..	59	Considerably.
11	Invincible	" 22	316	47 " 49	Stiff	3¼-4¼	28	40	62½	Slightly.
12	Buda Pesth	" 22	316	45 " 47	"	3-3½	26	..	62	"
13	Dawson's Golden Chaff	" 23	317	50 " 52	"	3-3½	26	..	58¼	Considerably.
14	Early Red Clawson	" 22	316	41 " 43	"	2¾-3¼	25	20	61½	"
15	Golden Cross	" 22	316	46 " 48	"	2½-3	25	20	63½	"
16	Surprise	" 25	319	50 " 52	"	3½-4	24	..	56½	"
17	Prosperity	" 23	317	46 " 48	"	3½-4	22	..	62½	"
18	Gold Coin	" 21	315	38 " 40	"	3-3½	19	20	60½	Slightly.
19	Egyptian Amber	" 25	319	40 " 42	"	3¼-3¾	19	20	59	Badly.
20	Padi	" 27	321	43 " 45	"	3¼-3¾	17	..	59½	"

STUDY OF THE QUALITY OF DIFFERENT VARIETIES OF WHEAT.

Reference was made in last year's report to the fact that the work of testing the quality of different varieties of wheat was being undertaken, and that preliminary tests of most of the valuable sorts of spring wheat had been completed. In view of the great importance of quality in wheat it seemed highly desirable that thorough investigations into this subject should be conducted at this Farm in order both to study existing varieties commonly cultivated, and also to test all the new sorts which might from time to time be produced here, or brought into Canada from other countries.

The purchase of a small roller-process flour mill made by the Allis-Chalmers Company expressly for grinding very small quantities of wheat was therefore approved by the Minister of Agriculture. This mill is now in use, and though the investigations have not, at this date, proceeded very far the great value of the apparatus has already been shown. The mill is provided with two pairs of steel rollers, one pair corrugated and the other smooth. There is also a sifting apparatus supplied with a dozen sieves of different degrees of fineness, from No. 16 wire gauze up to No. 14 bolting cloth.

With such a machine, it is possible to handle, with satisfaction, any quantity of wheat from a few ounces to several pounds, the most convenient amount being about one or two pounds. A good quality of 'straight' flour can easily be produced, sufficiently well purified to enable the experimenter to make satisfactory comparisons between the different varieties of wheat employed. If a more highly purified product is desired it is possible, by taking special care, to obtain 'patent' flour of very high grade.

The flour made by this apparatus is being subjected to chemical and mechanical analysis; and baking tests are also being carried on. The results of this work will be given to the public as soon as possible, with a view to encouraging the sowing (for flour-making purposes) of only those varieties of wheat which will give a product of high quality.

EMMER AND SPELT.

In June of the present year a bulletin was issued on Emmer and Spelt, giving descriptions of the different varieties and some comparisons between these and other cereals in regard to productiveness and chemical composition. It is therefore unnecessary to give such details in this report.

Single Emmer (*Triticum monococcum*) is again at the head of the list this year. Its extreme lateness in ripening is, however, a strong point against it.

Common Emmer ('Speltz') has not proved as productive as some other sorts this year.

Two of the varieties reported upon last year have been dropped from the uniform plots, Ufa Emmer because it proved to be identical with Common Emmer, and Black bearded Spelt because of its very coarse hull and rather small yield.

The plots of emmer and spelt were one-fortieth of an acre. The grain was sown on May 3 at the rate of about 120 pounds per acre.

EMMER AND SPELT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days maturing.	Length of Straw, including Head.	Character of Straw.	Length of Head.	Yield per Acre.	Weight per measured bushel after cleaning.	Rusted.
				Inches.		Inches.	Lbs.	Lbs.	
1	Single Emmer	Aug. 28	117	35 to 37	Stiff	2½ to 3¼	3,060	29½	Slightly.
2	Red Emmer	" 19	108	46 " 48	"	3 " 3¾	2,760	36	Considerably.
3	White Emmer	" 19	108	49 " 51	"	3 " 3¾	2,540	33	"
4	Smooth Spelt	" 19	108	47 " 49	"	3¾ " 5½	2,260	26	Badly.
5	Red Spelt	" 20	109	48 " 50	"	4 " 4½	2,240	26½	"
6	Common Emmer	" 12	101	45 " 47	"	2 " 2½	2,040	40	Considerably.
7	Thick Emmer	" 13	102	45 " 47	"	2½ " 3	1,980	34½	"
8	White Spelt	" 15	104	48 " 50	"	4½ " 5¼	1,740	24	Badly.
9	White bearded Spelt	" 12	101	48 " 50	"	4¼ " 5	1,680	24½	"
10	Long Emmer	" 31	120	51 " 53	"	3¼ " 3¾	1,220	22½	Considerably.

OATS.

The varieties of oats added to the experimental plots this season are as follows :—

Daubeney.—This was obtained in commerce in Ontario. It is a white oat with a loose, open head and ripens rather early.

Garton's Abundance.—A white oat with a loose head. Originated by Garton Bros., England. The imported seed was very plump.

Swedish Ligowo.—This is a strain of the well-known Ligowo oat which was obtained from Sweden and is said to be an improvement on the original variety.

Bell.—A black oat obtained from Sweden. The imported seed weighed 40½ lbs. per bushel.

Whiting.—A white oat of about medium size and with a loose head obtained from Sweden. The imported seed weighed 45½ lbs per bushel.

Gold Rain.—A yellow oat of medium size, obtained from Sweden. The imported grain weighed 43 lbs. per bushel. This variety has a rather small, moderately loose head, and ripens early.

Colossal.—A yellow oat with a loose head. Originated by Garton Bros.

Early Angus.—A white oat, obtained from Ireland. This did not give evidence this season of being an early variety.

Tlola.—A black oat from Finland, kindly sent to this Farm by Mr. C. Boije. The seed of this variety was received too late for sowing among the regular plots.

The plots of oats were sown on the 6th of May, all being one-fortieth of an acre except Swedish Ligowo, Bell, Whiting, and Gold Rain, which were one-eightieth. The cold weather in May proved unfavourable for the germination of the seed and for the growth of the young plants, especially in the lower parts of the field on which these plots were situated. Later in the season the oats were severely attacked by rust. The yield from the plots has therefore been somewhat irregular and unsatisfactory. In the case of some of the varieties the yield has been estimated from only one-half of the plot, and in the case of Bavarian, Columbus, Dixon, Golden Fleece, Prolific Black Tartarian, Swedish Select and Wallis, it seemed best not to estimate the yield at all, as it would have been quite misleading.

The yield per acre is expressed in 'bushels' of 34 pounds.

OATS—TEST OF VARIETIES.

Number	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw, includ'g Head.	Character of Straw.	Length of Head.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
				Inches.		Inches.	Bush.	Lbs.	Lbs.	
1	Lincoln	Aug. 13	99	48–50	Medium..	8 – 9	98	8	36½	Badly.
2	Twentieth Century	" 11	97	48–50	Weak....	7½– 9	93	18	34½	"
3	Wide Awake	" 13	99	50–52	Medium..	8½– 9½	89	14	36	"
4	Garton's Abundance	" 10	96	48–50	" ..	8½– 9½	89	14	34½	"
5	Ubergluss	" 11	97	46–48	" ..	8½– 9¾	87	22	34	"
6	Virginia White Abundance	" 10	96	46–48	" ..	8½– 9½	85	30	35	"
7	Milford White*	" 13	99	46–48	Weak....	9 –10	85	10	33¾	"
8	Swedish Ligowo	" 10	96	52–54	Stiff....	7½– 9	84	24	39½	"
9	American Triumph	" 13	99	45–47	Medium..	7½– 8½	80	20	33½	"
10	Mennonite	" 10	96	43–45	" ..	7 – 8	79	14	33¾	"
11	Sensation	" 15	101	47–49	" ..	8¼– 9	77	2	37	"
12	Beseler's Abundance	" 10	96	48–50	Stiff.. ..	8½– 9½	77	2	35½	Considerably.
13	Pioneer (black)	" 15	101	37–39	Medium..	7 – 8½	76	16	34½	Badly.
14	Andrecker	" 12	98	48–50	Stiff....	8¼– 9	75	30	37½	"
15	Hazlett's Seizure	" 16	102	45–47	"	9½–10¼	74	4	33	"
16	Holstein Prolific	" 17	103	40–42	Medium..	8 – 9	73	18	32	"
17	Kendal Black	" 15	101	47–49	Stiff.. ..	10 –11	72	12	36½	"
18	Early Golden Prolific	" 12	98	44–46	"	8 – 9¼	72	12	33½	"
19	White Giant	" 16	102	45–47	"	9½–10½	71	6	33	Considerably.
20	Golden Beauty	" 13	99	38–40	"	8½– 9	71	6	35	Badly.
21	Abundance	" 10	96	46–48	"	8¾– 9½	71	6	35	"
22	Kendal White	" 16	102	46–48	"	8½– 9½	70	20	33	"
23	Milford Black*	" 15	101	46–48	"	10 –11	70	20	36¼	"
24	Thousand Dollar	" 11	97	46–48	"	7¾– 8½	70	..	36½	"
25	Irish Victor	" 15	101	44–46	"	8 – 9	70	..	35	"
26	Banner	" 16	102	45–47	"	8½– 9¼	69	14	34	"
27	Pease Black*	" 16	102	44–46	Medium..	9½–10½	69	14	35½	"
28	Excelsior (black)	" 11	97	43–45	Stiff....	8 – 9	69	14	34¼	"
29	Atlantic	" 9	95	44–46	"	8½– 9½	68	28	37	"
30	Golden Giant	" 19	105	44–46	"	9 –10	67	2	30½	"
31	Great Northern	" 13	99	42–44	"	8 – 9	66	16	33	"
32	American Beauty	" 12	98	45–47	Medium..	8½– 9¼	65	10	34¼	"
33	Bruckler's Illinois	" 13	99	36–38	Weak....	5½– 6½	64	4	36	"
34	Bell (black)	" 14	100	50–52	Medium..	8½– 9½	63	18	30½	"
35	Whiting	" 10	96	44–46	Stiff....	8 – 9	60	..	36¾	"
36	Gold Rain	" 9	95	44–46	"	8 – 9	58	28	38	"
37	Scotch Potato	" 17	103	45–47	"	8½– 9½	58	28	34½	"
38	Danish Island	" 19	105	48–50	"	8¾– 9	57	2	34½	Considerably.

*Cross-bred varieties produced at the Experimental Farms are marked with an asterisk.

OATS—TEST OF VARIETIES—*Concluded.*

Number	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw, includ'g Head.	Character of Straw.	Length of Head.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
				Inches.		Inches.	Bush.	lbs.	Lbs.	
39	Big Four	Aug. 16	102	45-47	Stiff	7½-8½	54	21	33	Badly
40	Goldfinder	" 16	102	40-42	"	8½-9½	54	4	33	"
41	Olive White	" 17	103	45-47	"	9½-10½	53	18	34	"
42	Black Beauty	" 17	103	44-46	Medium	8½-9½	53	18	32	"
43	Improved American	" 17	103	42-44	Stiff	8½-9½	53	18	34	"
44	Colossal	" 13	99	48-50	Medium	9½-11	50	20	33	"
45	Olive Black*	" 20	106	40-42	Weak	8½-9½	47	2	33	"
46	Forbes*	" 20	106	44-46	Medium	9½-10½	47	2	34½	"
47	Early Angus	" 19	105	47-49	Stiff	8½-9½	46	16	32	"
48	Pense White*	" 16	102	41-43	"	8½-9½	46	16	35½	"
49	Daubeney	" 15	101	44-46	Weak	8½-9	45	10	32	"
50	Tartar King	" 12	98	38-40	Stiff	8½-9½	45	10	31½	"
51	Sorgenfrei	" 12	98	42-44	Medium	7½-8½	44	4	37	"
52	Welcome	" 11	97	44-46	"	6½-7½	43	18	35¼	"
53	Improved Ligowo	" 16	102	40-42	"	6½-7½	42	12	34	"
54	Joanette (black)	" 20	106	36-38	"	7½-8½	41	6	32½	"
55	Probstey	" 17	103	44-46	Stiff	8½-9½	40		33	"
56	Chinese Naked	" 11	97	38-40	"	5½-6½	32	12	50½	"
57	Golden Tartarian	" 20	106	47-49	Medium	10½-11½	31	26	29½	"
58	Siberian	" 19	105	45-47	Stiff	8½-9½	31	6	33	"
59	Waverley	" 18	104	45-47	"	8½-9½	25	10	32	"
60	Storm King	" 19	105	40-42	"	10½-11½	20	20	31	"

Most Productive Varieties of Oats.—The most productive varieties of oats at this Farm during the past five years have been White Giant, Mennonite (yellow), Hazlett's Seizure, Holstein Prolific (white and yellow, mixed), Lincoln, Banner and Uberfluss (white and yellow mixed). Columbus (yellow), Golden Beauty (yellow) Golden Giant (yellow), American Triumph, Sensation, Wide Awake and Abundance have also done very well. The most productive black oat during the past five years has been Black Beauty.

Earliest Varieties of Oats.—Taking the average of the returns for the past five years, Tartar King is the earliest variety of oats which has been grown on this Farm for the full period. The following varieties, which have not been grown for the full five years, are also of interest on account of their earliness: Welcome, Daubeney and Gold Rain (yellow).

SIX-ROW BARLEY.

The following varieties were added to the uniform plots this year:—

Escourgeon ('Escourgeon de Printemps,' 'Carrée de Printemps').—This variety was obtained from France.

Black Japan.—Obtained in commerce in Ontario. This barley is distinguished by the fact that its hull is very dark in colour. The kernel itself is rather dark, but not so dark as the hull.

Eclipse.—This is a so-called 'six-row Chevalier' barley originated by Garton Bros., England. It does not resemble the Chevalier type.

Bere.—This is a variety of barley well-known in Great Britain, where it is sometimes referred to as 'four-row' barley. It, however, belongs to the six-row class. The seed for the plot arrived very late and could not be sown with the other varieties. The

date of ripening and the number of days required for maturing are, therefore, not recorded this season.

The plots were all one-fortieth of an acre. The seed was sown on May 5 at the rate of 1¾ bushels to the acre. Both the yield and the quality of the grain were satisfactory.

The yield per acre is expressed in 'bushels' of 48 pounds.

SIX-ROW BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw, including Head.	Character of Straw.	Length of Head.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
				Inches.		Inches.	Bush.	Lbs.	Lbs.	
1	Stella*	Aug. 1	88	42–44	Stiff	3½–4	58	16	51	Slightly.
2	Nugent*	July 31	87	43–45	"	4 –4½	50	..	50½	"
3	Baxter	Aug. 2	89	39–41	"	3½–3¾	46	32	51	"
4	Yale*	" 1	88	42–44	"	2¾–3¼	45	20	48	"
5	Escourgeon	" 1	88	40–42	"	2 –2½	45	..	54	Considerably.
6	Sisolsk	" 2	89	40–42	"	3½–4¼	44	8	48¼	Slightly.
7	Common	July 28	84	36–38	"	3¾–4	43	36	51	"
8	Odessa	" 31	87	36–38	"	4 –4½	43	16	49½	"
9	Argyle*	Aug. 4	91	36–38	"	3 –3½	43	16	49½	"
10	Summit*	" 1	88	38–40	"	3¾–4¼	43	16	49½	"
11	Claude*	" 3	90	37–39	"	3½–4¼	43	16	50	"
12	Mensury	July 28	84	36–38	"	3¾–4	42	24	49½	"
13	Black Japan	Aug. 3	90	28–30	"	2 –2½	41	32	49½	Considerably.
14	Blue Long Head	" 6	93	34–36	Medium	3 –3½	41	12	42	"
15	Empire*	" 3	90	36–38	Stiff	3½–4	41	12	48	"
16	Garfield*	" 3	90	39–41	"	3¾–4	40	40	49½	Slightly.
17	Rennie's Improved	July 28	84	34–36	"	3 –3½	40	..	51½	"
18	Bere			28–30	Weak	3 –3½	39	8	45	Badly.
19	Bronze*	Aug. 3	90	37–39	Stiff	2¾–3¼	37	24	51	Slightly.
20	Hulless Black	" 4	91	34–36	Weak	3 –3½	37	4	61½	Considerably.
21	Oderbruch	" 3	90	38–40	Stiff	3 –3½	36	32	50½	Slightly.
22	Albert	" 2	89	36–38	"	4 –4½	36	12	49	"
23	Royal*	" 1	88	30–32	"	3½–3¾	34	8	50	"
24	Norwegian	" 4	91	34–36	Medium	3½–4	34	8	47	"
25	Eclipse	" 4	91	35–37	Stiff	3 –3¾	32	4	52	"
26	Trooper*	July 29	85	28–30	Medium	3 –3½	27	4	49½	"
27	Silver King	Aug. 2	89	30–32	Stiff	3¼–4¼	26	12	48½	"
28	Champion (beardless)	" 9	90	35–37	"	3 –3¾	22	24	42	"
29	Mansfield*	" 13	100	32–34	Medium	3 –3½	17	44	45	Badly.
30	Chinese Hulless	" 7	94	30–32	"	2¾–3¼	14	28	59½	"

*Cross-bred varieties produced at the Experimental Farms are marked with an asterisk.

Most Productive Varieties of Six-row Barley.—Taking the average of the returns for the last five years, the varieties of six-row barley found to be the most productive at this Farm are Stella, Blue Long Head, Odessa and Mensury.

Earliest Varieties of Six-row Barley.—The differences in earliness to be observed among the varieties of six-row barley are not very striking. Among the earliest sorts are Mensury, Common, Odessa and Stella.

Beardless Six-row Barley.—The tests carried on at this Farm indicate that Champion is the best variety of beardless barley that has been grown here. It gives, however, rather a small yield. It ripens early.

Hulless Six-row Barley.—The most productive variety of hulless barley which has been tested at this Farm is Hulless Black. This is a bearded sort.

TWO-ROW BARLEY.

Several additional varieties of two-row barley were included in the plots this season.

Swedish Chevalier, Princess, Primus and Hannchen are selected strains of seed from Sweden, kindly supplied to us through the courtesy of the United States Department of Agriculture.

Swan's Neck is another variety received from Sweden.

The seed of all these new sorts was very plump and heavy.

The plots of two-row barley were sown on May 4, the seed being used at the rate of two bushels to the acre. The plots were one-fortieth of an acre.

The yield per acre is expressed in 'bushels' of 48 pounds.

TWO-ROW BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw, including Head.	Character of Straw.	Length of Head.	Yield per Acre.		Weight per measured bush. after cleaning.	Rusted.
				Inches.		Inches.	Bush.	Lbs.	Lbs.	
1	Swedish Chevalier	Aug.	4	92	25—27 Medium	3¼—4½	47	24	52½	Slightly.
2	Swan's Neck	"	4	92	32—34 Stiff	3¾—3½	46	12	51½	"
3	Canadian Thorpe	"	4	92	28—30 "	3 —3½	44	8	52	"
4	French Chevalier	"	5	93	31—33 "	3¼—4	44	8	51½	Considerably.
5	Princess Sialof	"	9	97	28—30 Medium	3½—4½	43	36	51	Slightly.
6	Bestehorn's Kaiser	"	7	95	26—28 "	3 —3½	43	16	50½	Considerably.
7	Primus	"	1	92	31—33 Stiff	3 —3½	42	24	52	Slightly.
8	Princess	"	6	94	28—30 Medium	3½—4½	42	4	51	Considerably.
9	Standwell	"	7	95	28—30 "	3½—4	41	32	51	"
10	Gordon*	"	3	91	30—32 Stiff	2½—3½	39	28	51½	"
11	Invincible	"	8	96	27—29 Medium	3 —3¾	36	32	50½	"
12	Jarvis	"	1	89	40—42 Stiff	4 —4½	35	40	51½	Slightly.
13	Brewer's Favourite	"	8	96	27—29 Medium	3½—3¾	35	40	51½	Considerably.
14	Newton	"	8	96	26—28 Stiff	3 —3½	33	36	50	"
15	Danish Chevalier	"	1	92	33—35 "	4 —4½	32	44	51	Slightly.
16	Fulton*	"	3	91	34—36 "	3½—3⅝	32	44	52½	Considerably.
17	Clifford*	"	3	91	34—36 "	3¾—4	32	24	52	Slightly.
18	Hannchen	"	2	90	26—28 "	3½—4	32	24	53½	"
19	Fichtel Mountain	"	7	95	30—32 Medium	4 —4½	32	4	52	Considerably.
20	Beaver*	"	1	89	39—41 Stiff	4 —4½	31	32	50½	"
21	Sidney*	"	3	91	31—33 "	3½—4	30	20	52	Slightly.
22	Harvey*	"	6	94	33—35 "	3½—3⅝	29	28	51½	Considerably.
23	Pelham*	"	3	91	33—35 "	3½—4	28	36	49½	Slightly.
24	Plumage	"	8	96	32—34 "	3½—3½	28	36	49	Considerably.
25	Maltster	"	13	101	25—27 Medium	2½—3	21	12	52½	"
26	Logan*	"	10	98	31—33 "	3½—4½	20	..	49½	Badly.
27	Dunham*	"	12	100	32—34 "	3½—4	15	..	46½	"

*Cross-bred varieties produced at the Experimental Farms are marked with an asterisk.

Most Productive Varieties of Two-row Barley.—Taking the average of the returns for the past five years, the varieties of two-row barley found to be the most productive at this Farm are: French Chevalier, Canadian Thorpe, Beaver and Danish Chevalier.

Earliest Varieties of Two-row Barley.—The earliest among the more productive varieties of two-row barley grown at this Farm are: Beaver, Jarvis and Gordon. These ripen, as a rule, about two days before French Chevalier and Canadian Thorpe.

WINTER SIX-ROW BARLEY.

A variety of six-row winter barley known as Zero, was added to the plots of autumn-sown grain in 1903. This barley was introduced by Garton Bros., England, who claim extreme hardiness for it. A plot of one-eightieth of an acre was sown on the 10th of September, 1903, though the amount of seed on hand was only sufficient for a rather thin sowing. The plot was partly winter killed, but gave a yield at the rate of 41 bushels 32 lbs. per acre. The date of ripening was July 28.

Further tests of the hardiness and productiveness of this barley are being made.

PEASE.

The plots of pease were one-fortieth of an acre each. The seed was sown on the 4th of May at the rate of from two to three bushels per acre, according to the size of the pea. The crop produced this season was larger than the average.

A few of the less productive varieties of peas grown in previous years have been discontinued.

The yield per acre is expressed in 'bushels' of 60 pounds.

PEASE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw, including Head.	Character of Straw.	Length of Pod.	Yield per Acre.		Weight per measured bushel after cleaning.
				Inches.		Inches.	Bush.	Lbs.	Lbs.
1	Mackay*	Aug. 13	101	45-50	Strong	2½-2¾	45	40	62
2	Victoria*	" 19	107	55-60	"	2½-3	45	..	62¾
3	Golden Vine	" 12	100	50-55	"	2 -2½	42	20	63½
4	Prince*	" 14	102	55-60	"	2 -2½	42	..	62½
5	Prince Albert	" 13	101	60-65	"	2½-2¾	41	20	62
6	Archer*	" 15	103	45-60	Medium	2½-2¾	41	20	63½
7	Pieton*	" 12	100	40-45	"	2½-2¾	41	..	64
8	King*	" 13	101	50-55	Strong	2 -2½	39	40	63¼
9	Cooper*	" 14	102	45-50	Medium	2½-2¾	39	..	64
10	Nelson*	" 11	99	30-35	"	2 -2½	38	40	64
11	Prussian Blue	" 14	102	55-60	Strong	2 -2¼	38	20	64
12	White Wonder	" 9	97	30-35	Medium	2 -2¾	37	40	63½
13	Agnes*	" 12	100	45-50	Strong	2¼-2¾	37	20	64
14	Kent*	" 15	103	43-48	"	2¼-2½	36	40	62½
15	Field Gray	" 10	98	25-30	Weak	1¾-2¼	36	40	63
16	Wisconsin Blue	" 15	103	45-50	Medium	2 -2½	35	20	64¼
17	German White	" 10	98	45-50	"	2 -2½	34	40	63
18	Daniel O'Rourke	" 10	98	35-40	"	2 -2¼	34	..	62¾
19	Gregory*	" 19	107	40-45	Strong	2¼-2¾	34	..	63¾
20	White Marrowfat	" 13	101	40-45	"	2½-3	33	20	62
21	Canadian Beauty	" 13	101	55-60	"	2½-3	32	..	63
22	Macoun*	" 19	107	60-65	"	2 -2½	32	..	63
23	Black-eyed Marrowfat	" 13	101	45-50	"	2½-3	31	..	62
24	Chancellor	" 9	97	45-50	Medium	2 -2¾	30	..	63½
25	Arthur*	" 11	99	50-55	"	2½-2¾	29	40	63½
26	Mummy	" 19	107	43-48	"	2¾-2¾	29	40	63
27	English Gray	" 13	101	45-50	"	2 -2½	29	20	62
28	Early Britain	" 14	102	40-45	"	2¼-2½	27	20	61
29	Pride	" 9	97	35-40	"	2 -2½	26	..	62
30	Crown	" 10	98	40-45	Strong	2 -2½	26	..	64
31	Duke*	" 12	100	40-45	"	2¼-2¾	25	..	63½
32	Pearl*	" 11	99	45-50	"	2½-3	23	..	62¾
33	Carleton*	" 13	101	45-50	"	1¾-2¼	22	..	64
34	Paragon*	" 8	96	20-25	Weak	2¼-2¾	21	20	63

*Cross-bred varieties produced at the Experimental Farms are marked with an asterisk.

Most Productive Varieties of Peas.—Taking the average of the returns for the last five years, the varieties of peas found to be the most productive at this Farm are:—Golden Vine, Prussian Blue, Paragon, Cooper, Prince and Kent.

Earliest Varieties of Peas.—Chancellor appears to be the earliest ripening variety. It ripens, as a rule, about 4 or 5 days before Golden Vine and gives a good yield.

SPRING RYE.

One plot of spring rye (one-fortieth acre) was sown on May 3, the seed being used at the rate of one and one-half bushels to the acre. The rye made strong growth and was ripe August 7 (96 days). The straw was stiff, its length (including the head) being 64 to 66 inches. The length of the heads was from 3¾ to 4½ inches. The rye was slightly attacked by rust. The yield, expressed in 'bushels' of 56 lbs., was 34 bushels 36 lbs. per acre; and the weight of the grain (after cleaning) was 58½ lbs. to the measured bushel.

WINTER RYE.

Four varieties of winter rye were sown on September 10, 1903. The plots were one-eightieth of an acre. The seed was used at the rate of 1½ bushels per acre.

Giant and Emerald were obtained from France. Mammoth White was procured in New York State and Thousandfold in Ontario.

The yield per acre is expressed in 'bushels' of 56 lbs.

WINTER RYE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw, including Head.	Character of Straw.	Length of Head.	Yield per Acre.	Weight per Measured Bushel after Cleaning.	Rusted.
				In.		In.	Bush. lbs.	Lbs.	
1	Giant	July 25...	319	63-65	Weak	4½-5¼	70 40	56¾	No rust.
2	Emerald	" 25...	319	63-65	Medium	4¾-5¼	62 48	55	"
3	Mammoth White	" 21...	315	60-62	Stiff	4¾-5	57 48	59½	"
4	Thousandfold	" 23...	317	66-68	"	3¾-4	49 ..	60	"

GRAIN SOWN IN DIFFERENT QUANTITIES PER ACRE ON SANDY LOAM.

These experiments were all conducted on plots of one-fortieth of an acre each. The wheat was sown May 3 and was ripe August 9. The oats were sown May 3 and were ripe August 9. The barley was sown May 3 and was ripe August 2.

The results of the tests in previous years are published, for comparison, along with the figures obtained this year.

Name of Variety.	Quantity Sown per Acre.	Number of Days from Sowing to Harvesting.				Yield per Acre.							
		1901.	1902.	1903.	1904.	1901.		1902.		1903.		1904.	
						Bus.	Lbs.	Bus.	Lbs.	Bus.	Lbs.	Bus.	Lbs.
Preston Wheat	1 bushel.	100	108	108	98	10	20	24	..	15	..	22	20
" "	1¼ bushels	100	108	108	98	15	..	20	40	14	20	24	20
" "	1½ "	100	108	108	98	19	40	15	20	20	40	20	40
" "	2 "	100	108	108	98	20	20	10	40	15	20	17	20
" "	2½ "	100	108	108	98	21	..	20	40	13	20	17	20
" "	3 "	100	108	108	98	19	40	17	20	16	40	26	40
Banner Oats	1½ "	96	107	108	98	41	6	60	..	63	18	43	18
" "	2 "	96	107	108	98	59	14	45	30	56	16	78	8
" "	2½ "	96	107	108	98	57	2	52	32	79	14	75	10
" "	3 "	96	107	108	98	43	18	50	20	84	4	77	22
" "	3½ "	96	107	108	98	31	26	50	20	88	8	92	12
" "	4 "	96	107	108	98	35	10	54	4	67	22	84	4
Mensury Barley	1½ "	84	95	105	91	35	35	40	40	61	32	35	40
" "	2 "	84	95	105	91	37	19	28	16	60	..	49	8
" "	2½ "	84	95	105	91	43	11	27	24	54	28	40	40
" "	3 "	84	95	105	91	42	19	37	24	46	12	32	24
" "	3½ "	84	95	105	91	39	23	26	32	47	44	41	32
" "	4 "	84	95	105	91	43	11	45	..	35	40	52	44

GRAIN SOWN IN DIFFERENT QUANTITIES PER ACRE ON CLAY LOAM.

These experiments were all conducted on plots of one-fortieth of an acre each. The wheat was sown May 5 and was ripe August 8. The oats were sown May 5 and were ripe August 8. The barley was sown May 5 and was ripe July 28.

The results of the tests in previous years are published, for comparison, along with the figures obtained this year.

Name of Variety.	Quantity Sown per Acre.	Number of Days from Sowing to Harvesting.				Yield per Acre.							
		1901.	1902.	1903.	1904.	1901.		1902.		1903.		1904.	
						Bus.	Lbs.	Bus.	Lbs.	Bus.	Lbs.	Bus.	Lbs.
Preston Wheat	1 bushel.	97	108	108	95	28	20	24	40	28	40	16	40
" "	1¼ bushels	97	108	108	95	28	20	24	40	30	..	23	40
" "	1½ "	97	108	108	95	29	..	29	20	30	40	25	40
" "	2 "	97	108	108	95	26	20	28	..	28	..	22	20
" "	2½ "	97	108	108	95	26	20	30	..	29	40	21	20
" "	3 "	97	108	108	95	25	..	24	40	28	20	19	20
Banner Oats	1½ "	92	111	110	95	58	28	63	18	72	32	64	24
" "	2 "	92	111	110	95	65	30	62	12	78	28	63	38
" "	2½ "	92	111	110	95	67	2	72	32	74	4	71	6
" "	3 "	92	111	110	95	64	24	67	2	80	20	65	10
" "	3½ "	92	111	110	95	61	6	70	20	84	24	75	10
" "	4 "	92	111	110	95	57	22	67	2	88	28	66	16
Mensury Barley	1½ "	83	99	103	84	37	..	64	8	54	28	48	36
" "	2 "	83	99	103	84	40	35	76	40	59	28	46	12
" "	2½ "	83	99	103	84	44	3	68	16	48	16	52	24
" "	3 "	83	99	103	84	45	35	69	8	50	..	56	12
" "	3½ "	83	99	103	84	45	35	65	..	50	..	51	32
" "	4 "	83	99	103	84	44	3	62	24	58	16	54	8

PLOTS OF MIXED GRAIN.

It has been thought well to undertake some experiments in growing mixed grains, especially with a view to determining which varieties should be selected when two or more kinds are being sown together.

In choosing the varieties for these plots the greatest care is exercised to sow together only such sorts as are known to mature in almost the same number of days, so that they may both be ready for cutting at the same time. Only one column is given for the number of days maturing, as in every case the mixtures ripened with great uniformity.

The plots were one-fortieth of an acre, and the seed was sown on May 7, at the rate of one bushel per acre of each variety. In some instances this did not seem to be a large enough quantity of seed. It is therefore proposed to increase the amount next season.

—	Date of Ripening.	No. of Days Maturing.	Yield per Acre.	Proportions in Crop Harvested.				
			Lbs.					
Wheat and Oats—								
Preston wheat and White Giant oats	Aug. 13..	98	2,140 24	per cent wheat and 76 per cent oats.				
Wheat and Two-row Barley—								
Gehun wheat and French Chevalier barley	" 5..	90	1,880 42	"	"	58	"	barley.
Wheat and Pease—								
Huron wheat and Arthur pease	" 10..	95	1,700 52	"	"	48	"	pease.
Oats and Emmer—								
Banner oats and Common emmer	" 13..	98	2,560 72	"	oats	28	"	emmer
Oats and Two-row Barley—								
Welcome oats and French Chevalier barley	" 8..	93	2,180 57	"	"	43	"	barley.
Wallace oats and Princess Sialof barley	" 10..	95	1,820 60	"	"	40	"	"
Oats and Pease—								
White Giant oats and Chancellor pease	" 11.	97	2,520 80	"	"	20	"	pease.
Two-row Barley and Pease—								
Maltster barley and Paragon pease	" 14.	99	2,320 59	"	barley	41	"	"

SOJA BEANS.

In addition to the Common Soja Bean, experiments were tried this season with a selected strain of Early Yellow Soja Bean kindly supplied by Prof. C. A. Zavitz, of the Ontario Agricultural College. All the plots were sown on May 28 and cut on October 17. The size of the plots was one-fortieth of an acre. None of the beans ripened properly.

Early Yellow Soja Bean.—The beans were sown with a hand seed drill in rows 28 inches apart, and made strong growth, reaching a height of 30 to 35 inches. Total yield of green crop, 4 tons 600 lbs. per acre.

Common Soja Bean.—Two plots of this variety were sown, the beans being put in with different distances between the rows.

Plot 1.—Sown in rows 21 inches apart; growth strong and even, leafy; average height 35 to 38 inches; total yield of green crop, 4 tons 1,200 lbs. per acre.

Plot 2.—Sown in rows 28 inches apart; growth strong and leafy; average height, 35 to 38 inches; stalks considerably stiffer than in Plot 1; total yield of green crop, 4 tons 1,400 lbs. per acre.

HORSE BEANS.

Two plots of one-fortieth acre each were sown on May 28, with the rows at different distances apart. The plots were cut green on October 17. The beans did not ripen.

Plot 1.—Sown in rows 21 inches apart: growth strong, but rather thin; pods fairly numerous; height, 40 to 45 inches; crop all stood up well; total yield of green crop, 3 tons 1,660 lbs. per acre.

Plot 2.—Sown in rows 28 inches apart: growth very strong; pods fairly numerous; height, 40 to 45 inches; crop all stood up well; total yield of green crop, 5 tons 400 lbs. per acre.

FIELD BEANS.

Four plots of field beans were sown this season, in continuation of some experiments which have been carried on at this Farm for several years past, but which have not previously been mentioned in the Annual Report.

The plots were one-fortieth of an acre, and the beans were sown on May 28.

The yield per acre is expressed in 'bushels' of 60 lbs.

FIELD BEANS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Length of Pod.	Yield per Acre.
				Inches.	Inches.	Bush. Lbs.
1	White Field	Sept. 22..	117	23-27	4 -4½	46 40
2	Marrowfat	" 22..	117	25-30	3½-4	42 40
3	California Pea Bean	" 3..	98	15-17	3½-4¼	33 20
4	Norwegian Brown	Aug. 27..	91	14-16	5 -5¾	26 40

FLAX.

Uniform test plots of flax, one-fortieth of an acre each, were commenced this season for the purpose of ascertaining the relative productiveness and earliness of the different varieties. The seed of most of the kinds was obtained from France.

The seed was sown on May 28 at the rate of 60 pounds to the acre.

The yield per acre is expressed in 'bushels' of 56 lbs.

FLAX—TEST OF VARIETIES.

Number.	Name of Variety	Date of Ripening.	No. of Days Maturing.	Length of Plants.	Weight of Seed per measured bushel.	Yield per Acre.
				Inches.	Lbs.	Bush. Lbs.
1	Yellow Seed	Aug. 21..	85	31-33	52½	20 ..
2	Novarossick	" 23..	87	28-30	53½	19 10
3	White Flowering	" 15..	79	27-29	55½	16 40
4	Riga	" 22..	86	35-37	55½	15 10
5	Russian	" 11 ..	75	34-36	54½	12 20
6	Common	" 12..	76	31-33	55	12 ..
7	La Plata	Sept. 6..	101	26-28	52	11 10

TURNIPS

Two sowings were made of each variety, the first on May 17 and the second on May 31. The seed was used at the rate of about four pounds per acre. Before sowing, the land was made up in drills two feet apart and rolled with a heavy land roller, which flattened the drills nearly one-half, leaving a firm seed bed. When the young plants were about three inches high they were thinned out, leaving them about seven inches apart in the rows.

The roots were pulled on two different dates: October 14 and October 28. The yield per acre has been calculated from the weight of roots gathered from two rows, each 66 feet long.

A good yield was obtained.

In Canada the ton contains 2,000 lbs.

TURNIPS—TEST OF VARIETIES.

Number	Name of Variety.	Yield per Acre from 1st Sowing, 1st Pulling.		Yield per Acre from 2nd Sowing, 1st Pulling.		Yield per Acre from 1st Sowing, 2nd Pulling.		Yield per Acre from 2nd Sowing, 2nd Pulling.	
		Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
1	Magnum Bonum	42	150	17	1,310	47	545	25	1,480
2	Kangaroo	40	850	17	980	45	255	27	945
3	Hall's Westbury	40	272	20	1,827	46	1,060	31	535
4	Sutton's Champion	39	1,860	24	15	41	1,490	26	965
5	Imperial Swede	39	45	19	32	44	1,595	26	965
6	Halewood's Bronze Top	37	1,817	19	1,765	41	1,985	26	1,625
7	Hartley's Bronze	37	1,652	20	1,910	45	1,245	31	1,030
8	Mammoth Clyde	36	1,672	16	1,990	39	705	25	1,645
9	Jumbo	36	1,342	18	1,207	41	335	23	1,025
10	Emperor Swede	36	930	18	1,290	38	890	22	1,870
11	Good Luck	36	435	19	1,022	37	1,900	25	1,315
12	Perfection Swede	35	785	17	1,887	45	915	26	1,625
13	Drummond Purple Top	35	372	18	1,125	41	500	28	1,090
14	Carter's Elephant	34	227	20	260	44	1,265	25	1,150
15	Elephant's Master	33	1,155	18	135	37	250	24	1,665
16	Skirvings	32	1,010	18	630	41	1,325	26	470
17	Selected Purple Top	31	1,607	18	217	41	170	25	655
18	East Lothian	31	205	15	560	37	1,570	23	530
19	New Century	30	885	17	1,970	47	545	28	925
20	Bangholm Selected	24	1,830	18	1,207	32	850	26	1,955

	Tons.	Lbs.
The average yield from the 1st sowing, 1st pulling, was	35	1,255
The average yield from the 1st sowing, 2nd pulling, was	41	1,845
The average yield from the 2nd sowing, 1st pulling, was	18	1,657
The average yield from the 2nd sowing, 2nd pulling, was	26	973

MANGELS.

Two sowings were made of each variety, the first on May 17, and the second on May 31. The seed was used at the rate of about six pounds per acre. Before sowing, the land was made up in drills two feet apart and rolled with a heavy land roller to make a firm seed bed. When the young plants were about three inches high they were thinned out, leaving them about seven inches apart in the rows. The roots were pulled on two different dates: October 14 and October 28. The yield has been calculated in each case from the weight of roots gathered from two rows, each 66 feet long.

MANGELS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre from 1st Sowing, 1st Pulling.		Yield per Acre from 2nd Sowing, 1st Pulling.		Yield per Acre from 1st Sowing, 2nd Pulling.		Yield per Acre from 2nd Sowing, 2nd Pulling.	
		Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
1	Prize Mammoth Long Red	37	167	17	815	29	245	29	1,235
2	Half Long Sugar White	36	1,507	18	1,785	39	1,035	20	1,745
3	Mammoth Long Red	34	1,630	17	897	38	395	19	940
4	Mammoth Yellow Intermediate	34	722	17	1,640	33	1,815	18	135
5	Yellow Intermediate	32	1,257	16	1,907	32	1,010	16	175
6	Giant Yellow Intermediate	32	1,175	16	1,495	32	680	20	260
7	Triumph Yellow Globe	31	40	16	422	27	1,770	18	1,290
8	Lion Yellow Intermediate	30	637	17	1,310	29	1,070	18	795
9	Prize Winner Yellow Globe	30	142	15	1,762	22	880	16	670
10	Leviathan Long Red	29	1,482	14	1,452	34	1,465	20	1,085
11	Selected Mammoth Long Red	29	80	16	340	24	1,995	15	195
12	Giant Sugar Mangel	28	1,090	15	1,185	23	695	16	1,660
12	Giant Yellow Globe	27	285	13	1,390	20	920	13	1,885
14	Half Long Sugar Rosy	26	1,542	14	957	30	1,050	17	1,805
15	Selected Yellow Globe	24	1,665	14	1,287	24	1,665	14	1,370
16	Gate Post	24	1,005	16	670	26	470	17	815

	Tons.	Lbs.
The average yield from the 1st sowing, 1st pulling, was	30	1,277
The average yield from the 1st sowing, 2nd pulling, was	29	823
The average yield from the 2nd sowing, 1st pulling, was	16	582
The average yield from the 2nd sowing, 2nd pulling, was	18	754

CARROTS.

Two sowings were made of each variety, the first on May 17, and the second on May 31. The seed was used at the rate of about four pounds per acre. Before sowing, the land was made up in drills two feet apart and rolled with a heavy land roller to make a firm seed bed. When the young plants were about three inches high they were thinned out, leaving them about five inches apart in the rows. The roots were pulled on two different dates : October 14 and October 28. The yield has been calculated in each case from the weight of roots gathered from two rows, each 66 feet long.

CARROTS—TEST OF VARIETIES

Number.	Name of Variety.	Yield per Acre from 1st Sowing, 1st Pulling.		Yield per Acre from 2nd Sowing, 1st Pulling.		Yield per Acre from 1st Sowing, 2nd Pulling.		Yield per Acre from 2nd Sowing, 2nd Pulling.	
		Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
1	Giant White Vosges	24	1,995	21	570	30	1,545	22	1,045
2	Ontario Champion	24	840	16	1,165	26	965	24	180
3	New White Intermediate	24	592	18	1,785	24	1,535	20	755
4	Mammoth White Intermediate	23	200	19	1,600	27	1,110	18	1,785
5	Improved Short White	21	1,560	20	1,415	27	1,110	22	1,045
6	Long Yellow Stump Rooted	19	1,930	16	1,330	25	325	19	610
7	Carter's Orange Giant	19	1,022	17	1,805	22	1,870	21	1,395
8	Half Long Chantenay	18	1,950	13	1,225	17	1,310	13	70
9	Early Gem	18	300	17	1,805	16	1,495	18	1,290
10	White Belgian	17	815	14	710	18	630	13	895

	Tons.	Lbs.
The average yield from the 1st sowing, 1st pulling, was	21	520
The average yield from the 1st sowing, 2nd pulling, was	23	1,570
The average yield from the 2nd sowing, 1st pulling, was	17	1,541
The average yield from the 2nd sowing, 2nd pulling, was	19	907

SUGAR BEETS.

Two sowings were made of each variety, the first on May 17, and the second on May 31. The seed was used at the rate of about six pounds per acre. Before sowing, the land was made up in drills two feet apart and rolled with a heavy land roller to make a firm seed bed. When the young plants were about three inches high they were thinned out, leaving them about five inches apart in the rows. The roots were pulled on two different dates : October 14 and October 28. The yield has been calculated in each case from the weight of roots gathered from two rows, each 66 feet long. Though all the varieties mentioned here are commonly classed as sugar beets, it should be noted that the only ones recommended for use in the manufacture of sugar are Wanzleben, French Very Rich, and Vilmorin's Improved.

SUGAR BEETS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre from 1st Sowing, 1st Pulling.		Yield per Acre from 2nd Sowing, 1st Pulling.		Yield per Acre from 1st Sowing, 2nd Pulling.		Yield per Acre from 2nd Sowing, 2nd Pulling.	
		Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
1	Red Top Sugar	32	762	18	465	31	700	18	465
2	Royal Giant	31	40	18	135	31	535	18	795
3	Danish Improved	27	532	15	1,680	27	945	17	980
4	Danish Red Top	26	222	14	380	26	1,955	17	1,640
5	Improved Imperial	23	1,272	15	277	29	410	18	1,620
6	Wanzleben	21	982	15	1,432	18	1,785	16	505
7	Vilmorin's Improved	19	1,847	12	585	18	465	11	935
8	French Very Rich	17	1,062	11	110	24	345	16	1,999

	Tons.	Lbs.
The average yield from the 1st sowing, 1st pulling, was	24	1,810
The average yield from the 1st sowing, 2nd pulling, was	25	1,892
The average yield from the 2nd sowing, 1st pulling, was	15	133
The average yield from the 2nd sowing, 2nd pulling, was	16	1,866

INDIAN CORN.

The corn was sown with the seed drill in rows thirty-five inches apart, and was also sown in hills thirty-five inches apart each way. When the plants were about six inches high they were thinned out, leaving them from six to eight inches apart in the rows, and leaving four or five plants in each hill. The seed was sown June 7, and the corn was cut green for ensilage September 16. The yield has been calculated from the weight of crop cut from two rows, each 66 feet long.

For the making of ensilage the corn should be cut when the kernels are in the late milk or doughy stage; but the summer at Ottawa is not always warm enough to bring the later varieties to this state of maturity before it is necessary to cut the crop to avoid frost.

Thoroughbred White Flint was omitted this season, as it was not found possible to obtain seed of this variety in good condition.

In Canada the ton contains 2,000 pounds.

INDIAN CORN—TEST OF VARIETIES.

Number.	Name of Variety.	Character of Growth.	Height.	Leafiness.	Condition when Cut.	Weight per Acre grown in Rows.		Weight per Acre grown in Hills.	
			Inches.			Tons.	Lbs.	Tons.	Lbs.
1	Eureka	Strong	100–105	Very leafy	Early milk	26	140	21	570
2	Superior Fodder	Very strong.	110–115	"	"	25	600	28	100
3	Giant Prolific Ensilage	"	105–110	"	"	24	1,500	22	1,320
4	Salzer's All Gold	"	100–165	Medium	"	23	420	26	1,680
5	Red Cob Ensilage	"	105–110	"	"	21	1,780	23	970
6	White Cap Yellow Dent	Medium	85– 90	Very leafy	"	21	1,780	23	530
7	Early Butler	Strong	90– 95	Leafy	"	19	940	17	1,750
8	Mammoth Cuban	Very strong.	100–105	Very leafy	Late milk	18	1,730	19	1,380
9	Pride of the North	"	105–110	Medium	Early milk	18	850	20	370
10	Early Mastodon	Strong	100–105	Leafy	"	18	520	14	820
11	North Dakota White	Medium	65– 70	"	"	17	1,530	18	520
12	Cloud's Early Yellow	Strong	95–100	"	"	17	980	17	870
13	King Philip	Medium	70– 75	Medium	Late milk	17	320	19	830
14	Champion White Pearl	Strong	95–100	Leafy	Early milk	16	1,330	15	140
15	Compton's Early	Medium	75– 80	Medium	"	16	835	19	1,820
16	Longfellow	"	65– 70	Leafy	Late milk	15	1,240	17	1,200
17	Evergreen Sugar	"	75– 80	Very leafy	"	15	1,240	16	120
18	Angel of Midnight	Strong	70– 75	Leafy	Early milk	14	1,590	17	1,200
19	Selected Leaming	"	100–105	"	"	12	750	13	290

The average yield from the rows was 19 tons 109 pounds per acre, and from the hills, 19 tons 1,183 pounds per acre; showing an advantage, this season, of 1,074 pounds per acre in favour of the corn grown in rows.

INDIAN CORN SOWN AT DIFFERENT DISTANCES.

Three varieties were chosen for this test: Champion White Pearl, Selected Leaming, and Longfellow. The seed was sown June 7 and the corn was cut for ensilage September 16. Sixteen rows of each variety were sown, that is, four rows at each of the distances mentioned, and the yield per acre has been calculated from the weight of crop obtained from the two inner rows in each case. The length of the portions of the rows cut for weighing was 66 feet.

Name of Variety.	Distance between the Rows.	Character of Growth.	Height when Cut.	Condition when Cut.	Yield per Acre.	
	In.		In.		Tons.	Lbs.
Champion White Pearl	21	Very strong.	90— 95	Early milk	22	1,927
" "	28	"	105—110	"	18	669
" "	35	"	105—110	"	19	1,050
" "	42	"	105—110	"	21	488
Selected Leaming	21	"	95—100	"	22	1,360
"	28	"	100—105	"	17	686
"	35	"	100—105	"	20	1,030
"	42	"	100—105	"	20	1,548
Longfellow	21	Medium	70— 75	Late milk	17	209
"	28	"	80— 85	"	16	7
"	35	"	80— 85	"	14	1,810
"	42	"	80— 85	"	16	1,652

It will be seen that, in every case, the largest yield was obtained from the rows which were closest together; though the corn in these rows was not so tall as in the others.

FIELD PLOTS OF POTATOES.

As the experimental plots of field roots and fodder corn do not occupy the whole of the field in which they are placed, it is usual to fill the remaining space with potatoes, such varieties being grown as are likely to be of service in the annual distribution of samples from this Farm.

The area devoted to the different varieties varies considerably.

The potatoes were planted May 28 and dug October 8. A satisfactory crop was obtained. A certain amount of rot was noticed, the varieties chiefly affected being Carman No. 1, Uncle Sam, Bovee and Canadian Beauty.

The yield per acre is expressed in "bushels" of 60 lbs.

Number.	Name of Variety.	Yield per Acre.	
		Bush.	Lbs.
1	Dr. Macrcher	435	9
2	Burnaby Mammoth	421	25
3	Country Gentleman	408	.
4	Carman No. 1	372	8
5	Late Puritan	342	.
6	American Wonder	340	48
7	Uncle Sam	324	33
8	Swiss Snow-Flake	314	24
9	Money Maker	309	34
10	Reeve's Rose	309	24
11	Early White Prize	289	.
12	State of Maine	261	51
13	Bovee	246	5
14	Canadian Beauty	220	2
15	Dreer's Standard	210	35
16	Everett	202	8
17	Early Andes	194	20
18	Maule's Thoroughbred	191	24
19	Penn Manor	183	25
20	Vick's Extra Early	125	.

REPORT OF THE POULTRY MANAGER

(A. G. GILBERT.)

OTTAWA, December 1, 1904.

To DR. WM. SAUNDERS,
Director Dominion Experimental Farms,
Ottawa.

SIR.—I have the pleasure of submitting to you herewith the seventeenth annual report of the Poultry Department of the Central Experimental Farm.

The work of the past year has been marked by important features and results, principally confirmatory of experimental research, began some years ago. New lines of investigation and experiment have been undertaken, in the prosecution of which it is hoped to secure much useful and instructive data. Some of the subjects discussed in this report are :—

1. Advanced phases of poultry keeping.
2. Some features of the egg and poultry markets.
3. Reasons for the high price of strictly new laid eggs in summer.
4. Effects of early moulting on the summer egg supply.
5. Delay in the resumption of egg laying after the hens have moulted.
6. Early pullets required for fall layers.
7. Are fowls as good layers one season as another ?
8. Some reasons why pullets should be kept longer than one year.

The experimental work proper of the year is described in detail, and includes among other mattters :—

The treatment of the laying stock last fall so as to have them to go into winter quarters in proper condition.

Effects of various rations on groups of fowls of different ages.

Artificial and natural incubation and results.

Continued investigation into the cause or causes of so many weak germs in eggs laid in early spring by hens which were kept in warm houses and fed for egg production. Particulars are given in a number of tables.

Results of experiments to show how long after removal of the male bird from the breeding pen fertilization of the egg remains strong enough to hatch a strong chicken. The outside limit so far appears to be five days.

An important location of tuberculosis in fowls sent from British Columbia. The result of a *post mortem* examination by Dr. Higgins of the veterinary laboratory.

During the summer a poultry house, consisting of two divisions of 10 feet by 8, with scratching shed attachment 10 by 11 was erected. It is arranged and fitted according to the most approved and up-to-date designs. In the use of this house, which contains 25 pullets in each division, much valuable experience is anticipated.

On the morning of April 8 last, fire was discovered in the centre office of the main poultry building. It was fortunately extinguished before it had made serious headway, but not before 35 birds in adjoining pens had been suffocated; 75 early chickens were also burned to death, and one thousand eggs, set apart for incubator use were destroyed. This mishap caused delay in getting out early chickens and in the sending out of eggs for hatching purposes.

I have much pleasure in testifying to the ability and zeal displayed by my assistant manager, Mr. Fortier. His skill in the manipulation of the breeding stock and his care and success in the operation of the incubators and brooders were most marked. As a result of the latter, many details of value are embraced in this report.

Mr. George Deavey, I am happy to say, has shown interest and displayed energy in the discharge of his duties, with which, from long experience, he is now so well acquainted.

There were erected during this season, in addition to the poultry house mentioned, a temporary incubator room; colony houses of different sizes and design; brooders for incubators; trap nests, &c., &c. Two incubators of different patterns were also procured.

During the year addresses were delivered by the writer at Meaford, Winnipeg and at different points in Cape Breton, N.S.

Mr. Fortier delivered 43 addresses at meetings held throughout the province of Quebec during the months of January and February last. In March he attended a poultry show at St. Jerome, and another in August at Ayer's Flat. In August and September he attended poultry exhibits at Sherbrooke, Richmond and Ottawa. In the latter case the exhibit was made, during the month of September, at the annual fall show of the Central Canada Association, and consisted of an unusually attractive and instructive display, which elicited much appreciative comment.

Inquiry, both by letter and person during the year, in relation to all branches of poultry-keeping was greater than ever. It may be taken as a fair instance of the gratifying development that is rapidly taking place in the poultry branch of farm work, and which our experimental work is so well calculated to advance.

I have the honour to be, sir,
Your obedient servant,

A. G. GILBERT.

Before giving an account of the work of the past year it may be interesting and profitable to discuss certain features of poultry development which have made themselves evident during that period. It is gratifying to note that the poultry branch of farm work continues to make steady and satisfactory progress. Where fowls of the utility types are kept progress has been most rapid, and as a sequence of proper fowls and their good management results are satisfactory, because remunerative. Perhaps in no previous year has development in the more advanced phases of poultry-keeping been more apparent, more discussed and more inquired into than in the past twelve months. It may be asked what is meant by advanced phases of poultry-keeping ?

ADVANCED PHASES OF POULTRY-KEEPING.

By advanced phases of poultry-keeping are meant the thorough understanding of and putting into practice such methods of up-to-date management as experience has shown to be best calculated to enable producers to fill the requirements of the different markets of to-day to their greatest profit. A thorough and practical appreciation, then, of latest methods of management, as well as of the requirements of the market, is very necessary to success. Producers should realize that methods of poultry-keeping change from time to time, as do the requirements of the markets, and always in the way of advancement. It is to the advantage of producers to study the different features of the markets they are catering to. The city markets of to-day differ from those of even three and four years ago. There is an ever increasing call, from both

home and abroad, for better things and more of them. The most suitable product receives the highest value.

SOME FEATURES OF THE EGG AND POULTRY MARKET.

The markets of to-day may be described as follows :—

1.—A winter market with a growing demand for strictly new laid eggs for which high prices are paid more readily than heretofore. An article of guaranteed freshness, however, is required. A farmer's wife in the neighbourhood of the city writes on the 10th of November last (1904) 'that Mr. H. Gatehouse, poultry and game dealer, 806 Dorchester street, Montreal, has written offering me 40 cents per dozen for new laid eggs, but, they must not be more than 4 days old. His former limit was 10 days.' This shows a more exacting demand. It illustrates the trend of the market.

2.—A summer market imperatively calling for strictly new laid eggs with unimpaired flavour. They must also be of inviting appearance. The well-known firm of purveyors, Messrs. Bate & Son, Sparks street, Ottawa, paid as high, during midsummer last, as 25 cents per dozen to those from whom they could get eggs guaranteed strictly new laid. A member of the firm explained to the writer that these eggs were for customers 'who would take no other kind.' He added, 'and I will give now (August) 25 cents per dozen for such guaranteed strictly new laid eggs.'

3.—An Early Summer and Later Months Market for chickens of good size, correct type and in good condition, for which fairly remunerative prices are paid. The demand by the purchasing houses of Toronto heretofore has been for early 3½ to 4 months of age chickens for export. As to whether it will pay best to kill and dress those chickens for sale on a local or near city market, or to sell them alive, is a feature of the business requiring careful study. So far results go to show that, if the chicks are early and of requisite type and condition, it is best to sell them alive to one of the large purchasing firms for export. Mrs. Joseph Yuill writes 'that last spring she sold her first lot of early hatched chickens to the Canadian Produce Company of Toronto at 20 cents per lb. live weight.' But she must have had exceptional facilities for rearing the chickens at such an early season. It is to be remembered that these early chickens cannot be had except by artificial means, as pointed out in reports of previous years.

A STRIKING FEATURE.

The new and striking feature of the above situation is the enhanced price paid for guaranteed strictly new laid eggs in the summer months, and the effect it may have on the raising of chickens. It is in the summer months that chickens are hatched on the great majority of farms. The question occurs if the eggs are consumed where are the chickens to come from?

The reasonable conclusion is that whatever branch of the business pays the producer best is the one he is most likely to prosecute. Apart from the inducement offered by the high prices of last summer, it does seem as if the production of eggs during the summer would commend itself to the farmer, at any rate, as it is likely to be attended with the least trouble to him at a time of year when he is busiest. Looking at egg production by the farmer in winter the following is taken from departmental report of last year (1903) p. 245 : 'Observation has shown that there is a greater likelihood of a larger and more immediate supply of new laid eggs in winter from the farm, than of the superior quality of market poultry in later months. For the reason that so many farmers have more time in winter to care for their laying stock (and which attention is absolutely necessary) than they have in spring and early summer to devote to the hatching and rearing of chickens.' So it would seem that from both summer and winter standpoints the production of eggs is likely to be attended with the least difficulty to the farmer. We have also a skilled poultry authority, Mr. Boyer,

giving the following advice to an inquirer in a recent number of the American Poultry Journal to 'confine himself to the production of eggs as being the most profitable.' It is not likely, however, that a dearth of chickens will immediately follow, and it is quite possible that the high prices of summer and autumn eggs of the past two seasons may not be permanent. But it is a significant phase of the situation and one that the student of events is bound to take cognizance of.

WHY SUMMER EGGS HAVE BEEN SO HIGH.

It is an interesting phase and remarkable instance of the rapidity with which poultry keeping is taking place to find summer egg prices which have usually been 10 and 12 cents per dozen, attaining such values as 18, 20 and 25 cents for the same number. Eggs of the cheaper varieties were certainly to be had at the same time, but the increasing demand was for the better article. To the oft-repeated query, 'Why should new-laid eggs be so high at this season?' the reply was almost invariably given by the dealers, 'Because they are hard to get,' which was doubtless true, but it is not the only reason.

A more likely one is that consumers of the better class have found out, or, are being fast educated to the great difference there is between the clean looking, new-laid egg, with the delicious flavour it should always have, and the comparatively stale article. It is fast being realized that flavour and appearance can only come from carefully-fed and cleanly-kept fowls. Certainly in both appearance and flavour are the first quality eggs preferable to those laid by hens which have access to filthy substances, dirty water, &c., and deposit their eggs in unclean and ill-smelling nests.

Another reason may be that the more exacting demand for such carefully-selected eggs has resulted in city dealers buying from only reliable persons, who can be depended upon to send only what is wanted. These producers must be near the city market, or railway shipping point. A new laid egg stales quickly and shipments must necessarily be made frequently and in small quantities, in order to permit of the choice article being placed, as fast as possible, in the hands of the consumer. And the wideawake city purveyor finds out the number of hens the producer has, for he knows that no one with a few hens can save up eggs to make a large shipment without having the greater number of them in a stale condition. It is all important then that the producer should realize the value of and be guided by the following points:—

1. An egg, as soon—after it is laid—as possible should find its way to the consumer.

2. After being taken from the nest, the egg should be kept in a cool, sweet-smelling cellar or cupboard, and the flavour so preserved from contamination.

3. The nests in which the eggs are laid should be clean and free from odours.

4. The food of the fowls should be pure and wholesome.

5. It should be a strict rule to have no male bird with the hens which lay eggs for market. The eggs will so be unfertilized, which is desirable.

6. For breeding purposes in spring time select a suitable number of the best-shaped, best-laying and largest hens, and mate with them a male bird of good type and undoubted worth. These should be kept in separate quarters. When all the eggs desired for hatching purposes have been secured, the male bird should be disposed of and the hens kept in the breeding pen for two weeks longer before being allowed to run with the others. The above plan will do away with the necessity of having several male birds running promiscuously with the laying-hens in order 'to have eggs for hatching.'

THE MOULTING SEASON.

Another cause which to a certain extent may be affecting the usual summer supply of eggs, is the practice, becoming rapidly more common, of having fowls moult in

July, August or September. And in this connection there is another striking instance of rapid development in improved methods. Hardly had summer moulting been shown to be possible and comparatively easy—in the months named—than we had efforts more or less successfully made to shorten the period. The moulting season is one of non-production, during which moulting hens do not lay. It is advisable then to have the season of non-production at a period at which eggs, heretofore, have been at their lowest value, viz., summer. It is also necessary to have hens moult in summer in order to have eggs in winter. It has been a common practice in past years among farmers, and the practice is yet too frequent, to have their hens lay well in spring time, summer and fall, and moult during winter, the period of high prices. With the adoption of the method of having their hens moult in summer may, possibly, come a reduced production of eggs at that season and likely an increased output in winter. In report of last year, while referring to the subject, it was remarked 'that an increased winter supply of eggs and a less number in summer might result in the evening up of prices.' The trend of the markets to-day is towards a much higher summer value. The effect on the winter market of the past two years was not noticeable. Prices were rather higher last winter than ever before.

EFFORTS TO SHORTEN THE MOULTING PERIOD.

The moulting period usually occupies a period of 10 to 12 weeks, extending from end of July to end of September. The proprietor of a large poultry plant in the United States, and who was among the first to practice early moulting, claims to secure satisfactory results in 8 to 10 weeks. His method is to put his fowls at the beginning of July on quarter rations for ten or twelve days, meanwhile, keeping them in limited runs. At the end of this time the fowls are allowed full range and their rations increased to usual quantity. Cut bone, or, boiled livers, &c., &c., are fed, in liberal quantity two or three times per week.

A correspondent, in Nova Scotia, thought that with a diet of boiled and crushed beefheads, grain, grit, a free run, and access to grass, or, vegetables, 6 weeks should be the outside limit of the moulting period.

But developments take place quickly and we now have Mr. James Shackleton in his book on 'System in Poultry Keeping,' making the statement that it is unnecessary that hens should stop laying in order to moult. He says: 'Control of season and duration of moult are possible * * * * Perfect health and condition of fowls, freedom from damp and dirt in houses and absence of lice are essential to any control of moulting.' In a following page will be found full information as to care and treatment of the birds so as to bring on and expedite the moulting period.

DELAY IN RESUMPTION OF WINTER LAYING AFTER MOULTING.

Another interesting phase of poultry keeping which, in connection with summer moulting, has made itself apparent in recent years is delay in the resumption of egg laying after moulting. There seems to be an unnecessary and certainly unprofitable delay in the resumption of laying after the hens have moulted and are seemingly in the very best condition. This delay has also been noticed in early pullets, which show every indication of laying, but do not. A cause for this state of affairs is now engaging the attention of the best authorities on winter egg laying. In relation to the subject, the following quotation from an editorial in 'Farm Poultry' of November 1 last, will be read with interest:—'Soon after November 1 letters will begin to come to us from all quarters and the burden of the refrain of all will be, "Why don't my hens lay?" Each writer will tell how well developed his pullets are, how they have for some time looked as if they ought to lay, how well they are housed, fed and cared for, and how perversely, in spite of all the conditions being right, nature refuses to compel the pullets to produce the proofs of that fact.' Perhaps this delay in

the resumption of winter laying has been more marked in the present season than in any previous one. While there are doubtless causes, yet not apparent, close observation has shown that any of the following too common practices, is deterrant to early winter laying, viz.:—

1. In the case of pullets, neglect in care or feeding which has resulted in their becoming immature.

2. Moving hens or pullets from place to place when winter egg laying is expected. Put the birds into their winter quarters and let them remain in them, undisturbed. A run from pen to limited outside run is beneficial.

3. Overcrowding after being put into winter quarters. This applies to both hens and pullets and is more generally practised than is imagined.

4. Unnecessary exposure of pullets or newly moulted hens to cold fall rains, or, damp quarters.

5. Placing birds, suffering from colds, in laying pens instead of hospital. Neglected colds generally end in roup.

6. Lice infested fowls which, usually, is synonomous with filthy quarters.

7. Pullets from constitutionally weak, poor egg laying, or slow maturing strains of fowls.

8. A mistaken notion of economy which leads to the feeding—to growing pullets—of oats (very often of poor quality) instead of wheat, buckwheat or corn.

9. Hens improperly fed during their moult or allowed to hatch chickens late in the season.

10. Hens which have become overfat from being overfed during, or, soon after moulting.

EARLY HATCHED PULLETS TO THE RESCUE.

For the scarcity of eggs during the months of September, October and early part of November, and which has already been commented on, the practical remedy seems to be early-hatched pullets. In order to have pullets laying in these months they would require to be hatched out in April and early May at the very latest. Farmers should certainly have no difficulty in having them at that time. Experience has shown that to have pullets laying in July or August would necessitate their being hatched in January or February, and by artificial means, for it would be almost impossible to get broody hens at that season. For this reason, pullets so hatched are not likely—for some time to come, at least—to be as numerous as those later hatched. Records of our department show the following dates at which early artificially-hatched and reared pullets began to lay :—

1. Brown Leghorn pullet, first egg in July 17, when 4 months and 20 days old.

2. Two White Plymouth Rock pullets, first eggs on July 28, when 5 months of age.

3. A Cross-bred pullet, on July 28, when 5 months old.

4. A W. P. Rock pullet, on August 1, when 5 months and 3 days old.

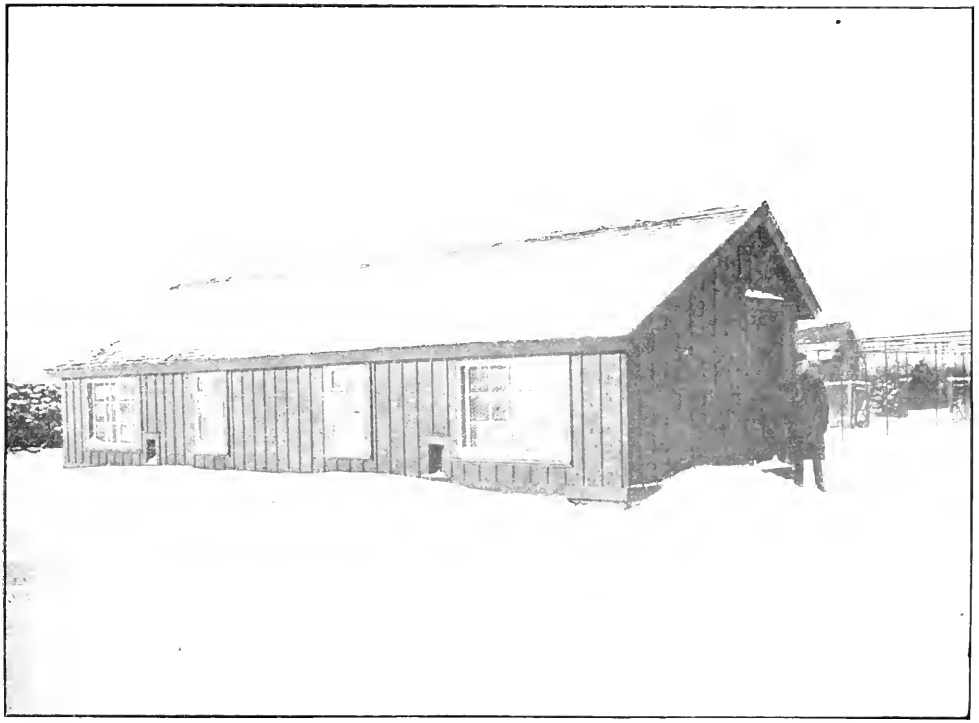
On another occasion several Barred P. Rock pullets hatched on March 26, began laying when 5 months of age, which would be at the end of August.

April and early May pullets laid at different dates in late September and October. Some of these were hatched by hens and others by incubator.

WHAT EXPERIENCE HAS SHOWN RELATIVE TO EARLY PULLETS.

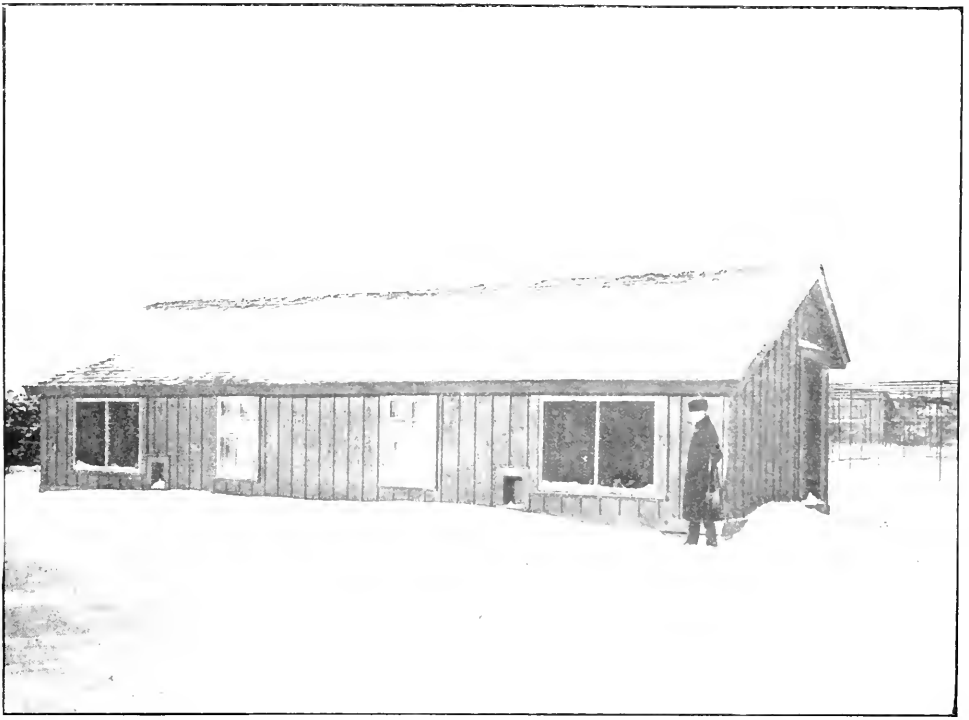
Experience in connection with the hatching of pullets, intended for early layers, leads to the following conclusions :—

Pullets to prove early layers should come from hens which have shown themselves to be early and prolific layers.



By Frank T. Shutt.

EXPERIMENTAL FARM NEW POULTRY HOUSE, WITH SHED ATTACHMENT,
SHOWING WINDOWS *closed* DURING HEAVY SNOW STORMS, AT NIGHT, OR ON VERY COLD DAYS.
WINDOWS FACE SOUTH.



By Frank T. Shutt.

SAME POULTRY HOUSE, SHOWING WINDOWS OF SCRATCHING SHED *open* ON FINE BRIGHT DAYS.
THROUGH WINDOWS CLOSED OR OPEN SUNSHINE HAS EASY ACCESS TO INTERIOR.
WIRE NETTING IN FRONT OF WINDOW.

To make fall layers, pullets should not be hatched out later than second week in May. Pullets should be gently pushed from time of hatching.

Early-hatched pullets should not be fed too much stimulating food, or they will begin to moult instead of laying.

Pullets intended for early layers should have a separate run and not be crowded.

Some strains mature much more quickly than others. This applies to all varieties.

Where eggs only are desired, a pullet from one of the Leghorn, Andalusian, Minorca or Hamburgh breeds will be found to make rapid maturity.

Where early egg-laying and flesh development are required, one of the Plymouth Rock, Wyandotte, Orpington, Dorking or Faverolle varieties will be found suitable.

Every effort should be made to hatch chickens from none but the best strains, *i.e.*, the most prolific egg-layers and best market types. This may entail some extra trouble, but it is necessary to ensure the beneficial results, almost, sure to follow.

ARE FOWLS AS GOOD LAYERS ONE SEASON AS ANOTHER ?

This is a question of great import. It is an interesting feature of poultry-keeping worth inquiring into. Records of egg-laying by pullets and hens in our department, extending over eight years, go to show that pullets which laid well during their first winter did not make as good layers the next, when hens. It was also shown that pullets which were poor layers during their first winter season did remarkably well when hens the next one. If the experience in the first instance was not offset by that of the second, it would go far to warrant the practice, on the part of many poultry keepers of holding their pullets for only one year and then disposing of them. Doubtless it will take the results of several years, yet to come, to confirm or modify the experience already noted, but meanwhile it is a phase of modern poultry-keeping worthy of remark as having made itself conspicuous on more than one occasion.

REASONS WHY FOWLS SHOULD BE KEPT LONGER THAN THEIR FIRST YEAR.

While the practice of keeping pullets for only one year has many advocates and some good features, experience has led to the conclusion that its general adoption is not advisable in the poultry interests of the country, for the following reasons, viz.:—

Pullets, as a rule, do not lay as large eggs as they do when they are hens.

The larger egg of the hen receives the better price and is preferred by city dealers.

Hens are preferable for breeding stock, for a pullet is admittedly an immature fowl. Writing recently on this subject, an eminent breeder strongly advises, 'that the breeding pen should always be composed of two-year-old hens of undoubted merit.'

At twelve months of age a fowl is not old enough to prove her worth as an egg-layer, or as being of suitable market type.

EXPERIMENTAL WORK OF THE YEAR.

Preparation for winter work began (as it should do in every case) in the fall. By the end of September last a number of the laying stock were well over their moult; a month later found them all in new feather and good condition. As in previous years care was taken to avoid getting these prospective winter layers in an overfat condition, which, through a desire to hasten winter laying by too heavy feeding, is often done. As noted in a previous page there is apt to be a tantalizing delay from the time the layers complete their moult until they recommence laying. It is likely, as a result of the improved methods now in vogue, that this interregnum will be shortened, and in the near future.

On November 10 the cold weather set in and the fowls went into their winter quarters. The different breeds were culled of undesirable specimens and were arranged in the pens of the different poultry houses as shown on page 255 of report of last year, 1903. As far as possible the pullets and older hens were placed in separate

buildings in order to permit of a correct egg record being kept. When arranged according to varieties, or, breeds the fowls presented a healthy and pleasing appearance, the result doubtless of their having the benefit of outside run until closed in.

THE INTRODUCTION OF SUPERIOR BREEDING STOCK.

On December 15 several new males and females of superior quality and appearance were added to those already in stock. The male birds which had been purchased at the Guelph Fat Stock Show, held in the beginning of the month, were exceptionally fine breeding stock and as they were mated with selected females, their progeny were unusually good. Those persons who purchased eggs from the hens of these matings last spring, could not have failed to be pleased at results, where good hatches were secured.

WHEN THE PULLETS BEGAN TO LAY.

The pullets of the different varieties began to lay as follows:—

White Wyandotte pullet, November 8.
Buff Orpington pullet, November 11.
Jubilee Orpington pullet, November 11.
Silver Grey Dorking pullet, November 12.
Cross-bred pullet, November 20.
Barred P. Rock pullet, November 26.

FIRST HENS TO LAY AFTER MOULTING.

The following hens were the first to resume laying after moulting:—

White P. Rock hen on November 6.
Rhode Island Red hen on November 7.
Barred P. Rock hen on November 9.
White Wyandotte hen on November 11.
Buff P. Rock hen on November 11.

By the middle of the month (December) winter laying had become general. The weather was unusually cold and during the holiday season—at the end of the month—the demand for new laid eggs was very great with a rather limited supply, probably due to the early and continued severity of the weather.

EXPERIMENTAL RATIONS AND THEIR EFFECT.

In order to ascertain their worth as winter egg producers and their effect on the health of the fowls, a number of simple and cheap rations, such as could easily be procured on the farms of the country, were made up and fed to groups of birds of different ages in manner, quantity and frequency, as follows:—

Pen No. 1 was composed of 10 Barred Plymouth Rock hens of one, two and three years of age. Their rations were:—

A.M. ration—$\frac{3}{4}$ lb. of grain—$\frac{1}{2}$ wheat, $\frac{1}{2}$ oats.
Noon ration—1 lb. of mash, composed of $\frac{1}{3}$ shorts; $\frac{1}{3}$ ground oats; $\frac{1}{3}$ gluten meal.
P.M. ration—Same as morning.

The result in eggs during the months named was as follows :—

1903.	
November	19
December	37
1904.	
January	54
February	25
March	82
April, up to 7th instant, inclusive	19
	236

A fire which occurred in the main poultry building on the morning of April 8 necessitated the immediate liberation of the birds and they became for the time-being unavoidably mixed. This mishap prevented the continuation of the test beyond the date given. The experiments have been resumed this season under similar conditions.

Pen No. 2, composed of 10 one, two and three-year old Barred Plymouth Rock hens were fed, as follows :—

A.M. ration—10 ozs. of grain, of which ⅓ was oats and ⅔ wheat.

Noon ration—3 days of the week 10 ozs. of mash of same composition as in No. 1 pen. Remaining 4 days, 10 ozs. of cut bone in lieu of mash.

P.M. ration—Same as morning ration.

Result in eggs was :—

1903.	
November	10
December	48
1904.	
January	65
February	37
March	98
April, up to 7th instant, included	26
	284

Pen No. 3 contained 10 White Plymouth Rock hens one and two years of age. Their food was :—

A.M. ration—¾ of a lb. of wheat.

Noon ration—¾ lb. cut bone and 2 lbs. beets on alternate days.

P.M. ration—¾ lb. wheat.

Number of eggs laid :—

1903.	
November	25
December	31

1904.

January	32
February	21
March	62
April, up to 7th instant, inclusive	26
	197

Pen No. 29 was composed of 9 pure-bred hens of different varieties. Their rations numbered only two per day and were :—

A.M. ration—¾ lb. of grain, viz., ⅔ wheat and ⅓ oats.
P.M. ration— " " " "
Every day 1 lb. of beets.

Number of eggs laid :—

1903.

November	2
December	41

1904.

January	33
February	30
March	82
April, up to 7th instant, inclusive	5
	193

Pen No. 30, composed of 9 pure-bred pullets of different varieties. Their rations were two per day, viz.:—

A.M. ration—¾ lb. grain, composed of ⅔ oats and ⅓ wheat.
P.M. ration— " " " " "
1 lb. mangels every day

Result in eggs was :—

1903.

December	29

1904.

January	28
February	19
March	61
April, up to 7th instant, inclusive	19
	156

Pen No. 31, contained 9 pullets of Barred P. Rock and Brown Leghorn cross. Their rations were fed twice per day :—

A.M. ration—¾ lb. grain, composed of ⅔ oats and ⅓ wheat.
P.M. ration— " " " " "
1 lb. of roots every day.

Number of eggs laid were :—

1903.	
November	12
December	64
1904.	
January	107
February	50
March	90
April, to 7th instant, inclusive	18
	341

CONTINUED INVESTIGATION INTO CAUSES OF WEAK GERMS IN EARLY SPRING EGGS.

For several years past experiments have been conducted with the object of ascertaining the cause of so many weak germs in eggs laid in early spring. The weak germs directly affect the profitable hatching and rearing of early chickens. It is, therefore, important to discover the cause, or causes, and remedy, if possible. The fowls under observation were in two groups and kept under the following conditions :—

GROUP 1.—Hens were kept in artificially warmed compartments.

They had laid fairly well from early December.

They had been gently stimulated to lay by generous feeding.

They were in numbers of 10 to 15 in pens, each 8 x 14 feet dimensions.

They were confined to these pens from early winter until spring weather permitted their getting to outside runs.

Results noted were :—

That the germs of the eggs from these hens were so weak as to die in large numbers in progress of incubation. Chickens when hatched were weak.

That the germs remained weak until the hens had opportunity, in spring, to get to outside runs and recuperate.

That the germs apparently became strong about the middle of April, and when set at, or, after that time, gave good results. See reports of previous years.

GROUP 2.—The hens in this group were in cold quarters, which were two rough divisions of a shed. Into this shed there was opportunity for limited run.

Eggs from these hens were collected soon after being laid, or they would have been frozen.

The hens were heavily fed and laid exceedingly well.

The germs of the eggs laid by these hens, in early spring, were strong and hatched 9 and 10 chickens per setting of 13 eggs. The chickens grew well.

The hens were mated with vigorous cockerels.

Results were considered in favour of fresh air and plenty of it even if it was cold.

Similar experience on the part of farmers and poultry-keepers has led to the more general adoption of the poultry-house with scratching-shed attachment. Illustrations and descriptions of poultry-houses so constructed, are shown in reports of poultry department for 1902 and 1903. In these reports will also be found details of the experimental work carried on, up to that time, in connection with the germination of eggs laid in early spring.

INCREASED OPPORTUNITY FOR FURTHER INVESTIGATION.

In order to permit of further examination into this important phase of poultry-keeping, a poultry-house of moderate dimensions with scratching room attachment and arranged and fitted in the latest and most approved methods, was erected during

the past summer in close proximity to our main poultry building. A brief description of this poultry house is as follows:—

Size of building, including scratching sheds, outside measurement, 12 x 40 feet. Size of roosting rooms, inside measurement, 8 x 9'6 feet. Size of scratching sheds, inside measurement, 11 x 9'6 feet.

The walls of the building are of 2 x 3-inch studding, covered with rough boards and matched lumber with tarred paper between and battens on joints. The roosting rooms, inside walls and ceilings are sheeted with rough lumber. The partitions between roosting rooms and scratching sheds are also sheeted with two-ply rough boards with tarred paper between.

The floors of the roosting rooms, one scratching shed and passageway are of concrete. The floor of the remaining scratching shed is of sand placed on a foundation of twelve inches of rough stones. The building is painted on the outside and in the passageway inside with two coats of paint; on the other parts inside are two coats of whitewash.

A building of similar size and calculated to give almost equally good results could be constructed of rough lumber, and a floor of rough boards or earth take the place of the concrete. Whitewash could also be used on the outside in lieu of paint. The estimated cost of such a building would be about $2.75 per running foot, the lumber being calculated at $15 per thousand and shingles at $3 per thousand.

ARTIFICIAL AND NATURAL INCUBATION—HATCHING CHICKENS AT DIFFERENT SEASONS AND RESULTS.

The work of examination into the strength of germs in eggs laid early in spring was continued last season. During the winter the male birds had been placed with the hens in Nos. 1 and 3 houses.

On February 20 last, the first incubator was filled. In previous years hens were mainly used as hatching and rearing mediums, but last season artificial hatching and brooding were generally adopted. With the object of comparison as hatching mediums a certain number of hens were used. Experience of past years has clearly shown that where mid-winter or early spring experimental work is carried on in the testing of the fertility and strength of the germs of eggs, or, hatching of chickens, artificial means are indispensable for hens as hatching mediums are impossible to be obtained in requisite numbers at that season.

When the hatching and rearing of broilers for the spring market is carried on as it is by many establishments, operations generally begin early in December or January. In such cases incubator room and brooding house or houses are imperative means to an end. In the following details of the operating of incubators of various patterns at different times and conditions, much that is interesting and instructive may be learned. To the beginner the results shown from the cooling of the eggs at shorter or longer periods according to the season; the number of times and regularity with which the eggs were turned; ventilation of the incubator; supply or non-supply of moisture; temperature of operating room (which was not well adapted for the purpose) and of the incubators and other details, cannot fail to be useful, because so much inquired about. It was not intended to have a competition of incubators of different designs, for in operation of them, our own methods of manipulation were adopted and were largely experimental. The different tests and results are given in the following tables:—

No. 1 Test.—Prairie State Incubator. Hot Air.

Filled on February 20, 1904, with eggs in quality and kind as follows:—

Description of Eggs.	No. of Eggs.	Clear Eggs 1st Test.	Dead Germs 16th day.	Chicks dead in Shell.	Chickens Hatched.
Silver Laced Wyandottes	20	3	7	2	8
Buff Orpingtons	14	3	8	3	0
Silver Grey Dorkings	14	2	8	0	4
Faverolle	12	2	3	4	3
White Wyandottes	9	2	7	0	0
Barred P. Rock (No. 2 pen)	8	0	3	3	2
Black Hamburg	7	3	4	0	0
White Plymouth Rock	6	0	0	0	6
Total	90	15	40	12	23

Birds had all the same care and feeding.
Incubator was operated in the office, the atmosphere of which was very dry.
Variation of temperature in room during hatch was from 25 to 30 degrees.
No moisture was used in either machine or room.
Time of cooling the eggs was:—
1st week 10 to 12 minutes.
2nd week 15 to 20 minutes.
3rd week 25 to 30 minutes.
Door of incubator was left open during the cooling of the eggs.
Eggs were turned once per day after cooling.

Test No. 2.—Chatham 'Red Bird' Incubator. Hot Air.

Filled on February 27, 1904, with eggs as follows:—

Description of Eggs.	No. of Eggs.	Clear Eggs 1st Test.	Dead Germs 16th day.	Chicks dead in Shell.	Chickens Hatched.
Buff Orpington	16	4	5	2	5
Silver Grey Dorkings	16	1	8	3	4
Silver Laced Wyandottes	15	2	2	1	10
White Wyandottes	11	3	6	1	1
Faverolle	11	3	3	3	2
Barred P. Rock	13	0	3	4	6
Black Hamburg	8	2	6	0	0
Black Minorca	5	1	4	0	0
White P. Rock	5	2	2	1	0
	100	18	39	15	28

Birds were kept under same conditions with exception of Barred and White P. Rocks which were under experiment.
Incubators were placed in same office as No. 1.
Temperature of room and time of cooling the eggs same as No. 1.
Water was constantly kept in moisture pan.

TEST No. 3.—CYPHERS INCUBATOR (220-EGG SIZE). HOT AIR.

Filled on March 5, 1904, with following eggs:—

Description of Eggs.	No. of Eggs.	Broken by Accident.	Clear —1st Test.	Dead Germs.	Dead in Shell.	Chickens Hatched.
Buff Orpington	43	4	8	13	5	13
White Wyandotte	32	2	12	9	2	7
Silver Grey Dorkings	27	0	5	18	1	3
White Leghorn	23	0	2	13	7	1
Barred P. Rock	20	0	1	10	5	4
Black Minorca	16	0	2	7	3	4
Rhode Island Reds	12	0	2	6	4	0
Faverolle	10	0	2	5	1	2
Silver Laced Wyandotte	16	0	1	3	2	10
Black Hamburg	10	0	1	5	2	2
Jubilee Orpington	8	0	2	6	0	0
Buff Leghorns	7	2	1	1	0	3
White Plymouth Rock	4	0	1	2	0	1
S. Spangled Hamburg	2	0	0	2	0	0
	230	8	40	100	32	50

Incubator was placed in same office as Nos. 1 and 2, with similar variations of temperature.

Time of cooling eggs same as Nos. 1 and 2.

TEST No. 4.—DESMOINES (HOT WATER) INCUBATOR. 260-EGG SIZE. FILLED APRIL 26, 1904.

This test and the following one was conducted in a new building erected as a result of the fire previously referred to. The incubator was filled with the following eggs:—

Description of Eggs.	No. of Eggs.	Accidentally broken.	Clear 1st Test.	Dead Germs.	Dead in Shell.	Chickens Hatched.	Remarks.
Barred P. Rock	38	1	5	8	1	33	
White Leghorn	45	2	7	6	3	30	
B. P. R. Bro-Leghorn Cross	32	0	8	1	0	13	
Silver Grey Dorking	24	0	8	1	0	12	
White Wyandotte	18	0	3	2	1	12	
Buff Orpington	11	0	5	4	1	1	
White Plymouth Rock	15	1	0	4	0	10	
White Wyandotte Cross	14	0	0	3	0	11	
Jubilee Orpington	9	0	0	2	0	7	
Light Brahma	10	1	2	1	1	5	
Black Hamburg	10	1	2	1	0	6	
Silver Laced Wyandotte	5	0	0	0	0	5	
Faverolle	6	0	2	0	1	3	
Black Minorca	3	0	0	0	0	3	
S. Spangled Hamburg	7	0	1	2	0	4	
	237	6	41	34	8	148	

Eggs were turned twice per day, the first at cooling time and once afterwards.

Ventilators half open, all the time.

Doors of the incubator were left open all the time of cooling.

No. of days.	Temp. of Room. A.M.	Temp. of Room. P.M.	Temp. of Incubator. A.M.	Temp. of Incubator. P.M.	Time of Cooling.	Remarks.
1	52	58	92	102		
2	58	58	102	102		
3	57	67	102	102		
4	58	64	102	102	10 minutes.	1st cooling and turning
5	54	64	102	103	12 "	a.m.
6	60	80	103	103	12 "	1st test.
7	65	82	103	103	14 "	
8	52	85	103	103½	14 "	
9	56	80	102	103	15 "	
10	56	74	102	104	15 "	
11	61	84	103	104	15 "	
12	67	81	103	103	15 "	
13	66	87	102½	104	20 "	
14	59	78	102	103	30 "	
15	63	70	103	103	30 "	
16	55	75	103	103	30 "	
17	59	83	102½	103	30 "	Last test.
18	58	84	103	104	30 "	
19	67	61	103	103	35 "	Last cooling.
20	60	64	103	103		
21	56	78	103	103		

Test No. 5.—Cyphers Incubator (220-Egg Size). Hot Air.

Filled on May 14, 1904, with following Eggs. Machine was operated in new building for reason explained in No. 4.

Description of Eggs.	No. of Eggs.	Clear Eggs.	Dead Germs.	Dead in Shell.	Chickens Hatched.	Remarks.	Days.	Temp. of Room.		Temp. of Incubator.		Time of Cooling Eggs.	Remarks.
								A.M.	P.M.	A.M.	P.M.		
Barred P. Rocks	31	14	0	2	15		1	....	84	....	103		
Buff Orpington	26	5	3	1	17		2	67	61	103	103		
White Plymouth Rock	21	0	5	4	12		3	60	64	103	103		
Black Hamburg	15	2	5	4	4		4	56	78	103	104½	15 minutes.	1st cooling of eggs.
B. P. R.—Brown Leghorn Cross	16	5	1	0	10		5	57	78	103	103	25 "	
White Wyandotte	15	8	1	2	4		6	60	65	103	103	25 "	1st test.
Silver-Laced Wyandotte	12	3	3	1	5		7	62	72	104	103	25 "	
Faverolle	11	4	2	2	3		8	63	84	104	103	30 "	
White Leghorn	14	1	3	1	9		9	68	67	103	103	30 "	
Light Brahma	11	5	4	1	1		10	66	76	103	103	30 "	
Black Minorca	7	1	1	1	4		11	69	88	104	104	30 "	
S. Spangled Hamburgs	7	2	4	0	1		12	70	72	104	103½	28 "	
Buff P. Rocks	5	0	1	1	3		13	68	83	104	103	45 "	
Silver Grey Dorking	9	2	0	1	6		14	66	84	103	103	45 "	
							15	56	76	104	103½	45 "	
	200	52	33	21	94		16	58	78	103½	103½	40 "	Last time of testing.
							17	60	76	103½	103	45 "	
							18	54	71	103	103	45 "	
Eggs were turned twice per day.							19	60	69	102	103	45 "	Last time of cooling.
Ventilators half open all the time.							20	60	71	103	103½		
During the time of cooling eggs the incubator doors were left open.							21	71	76	103	103		

TEST No. 6.—FOUR HENS AS HATCHING MEDIUMS.

On April 20, 1904, they were given 13 eggs each of the following kinds:—

Description of Eggs.	No. of Eggs.	Clear —1st Test.	Dead Chicks in Shell.	Chickens Hatched.
S. C. Dorking	8	3	0	5
White Leghorn	8	0	3	5
B. P. R.—Brown Leghorn Cross	4	1	6	3
Black Hamburgs	3	0	0	3
Buff Orpington	3	0	0	3
White Wyandotte	5	1	0	4
Barred P. Rock	5	1	0	4
Faverolle	3	0	0	3
Jubilee Orpington	3	1	1	1
White Plymouth Rock	2	0	0	2
S. Spangled Hamburg	2	0	0	2
Buff Plymouth Rocks	2	0	0	2
Light Brahmas	1	1	0	0
Black Minorcas	3	1	0	2
Totals	52	9	4	39

TEST No. 7.—In which a number of hens were used as hatching mediums. They were set at different times during May, 1904, on the following eggs:—

Date when set.	Description of Eggs.	No. of Eggs set.	Clear —1st Test.	Dead Germs.	Dead Chicks in Shell.	Chickens Hatched.
1904.						
May 2...	Light Brahmas	10	2	0	2	6
" 5...	Buff Leghorns	36	10	1	1	24
" 5...	Black Minorcas	52	10	8	10	24
" 7...	White Wyandottes	60	17	5	6	32
" 14...	S. C. Dorking	15	3	2	3	7
" 14...	Faverolle	15	3	1	1	10
		188	45	17	23	103

The number of clear eggs on May 2, 5 and 7, goes to show that the birds, in the latter part of the month of April when the eggs were collected, had not completely recovered from the effects of the fire which occurred on the 8th of the latter month. Later, the percentage of clear eggs, it will be noticed, is very much less.

MANAGEMENT OF THE SITTING HENS.

The following has been found a convenient and effective method in managing the sitters. As the hens became broody they were put in wooden cases of suitable size and without bottoms, which were placed in pens by themselves. The boxes had

hinged doors in front so as to be opened, or closed as required. Comfortable nests were made of dry lawn clippings, or oat straw. Previous to putting a hen on her nest she was thoroughly dusted with insect powder and so was her nest. Experience has proved that lice infested hens are not successful sitters. The hens are allowed to sit for twenty-four and thirty-six hours on three or four china eggs. Having proved themselves reliable sitters the imitation eggs were removed and they were replaced by the valuable eggs. Borrowed sitters should always be so treated for they are generally infested with vermin and a source of contamination to nest and premises they happen to be placed in. Grain of different kinds mixed, grit and drink water were always before the sitters.

HOW LONG DOES THE EFFECT OF FERTILIZATION LAST.

Two interesting experiments, particulars of which are given in the two following tables, were made at the conclusion of the breeding season last summer. The objects aimed at were:—

1. To find out how long after the removal of the male bird from the breeding stock was fertilization strong enough to hatch out into a healthy chicken.

2. How long after the removal of the male bird could the effect of fertilization be traced?

The questions are answered by the results in the following tests 8 and 9.

TEST No. 8.—With seven Barred P. Rock hens from which the male bird was separated on June 29, 1904. On the same day eggs were put into an incubator and thereafter, from time to time during twenty days. Details are:—

Date.	No. of days male bird separated from hens.	No. of eggs set.	Clear eggs, 1st test.	Dead germs.	Dead in shell.	Chickens hatched out.	Remarks.
1904.							
June 29..	.....	3	1	1	.....	1	Strong chicken.
" 30..	1	1	1	.....	.....	...	No results from this egg as it was clear.
July 1..	2	3	1	.....	.....	2	Strong chicken.
" 2..	3	3	1	.....	.....	2	"
" 3..	4	2	1	.....	.....	1	Weak chicken.
" 4..	5	3	1	.....	.....	1	Healthy chicken.
" 5..	6	3	1	.....	.....	2	"
" 6..	7	1	1	.....	.....	.....	Egg without germ; no result.
" 7..	8	1	.....	1	.....	.....	Germ dead from weakness.
" 8..	9	1	1	.....	.....	.....	Egg not fertilized; no result.
" 9..	10	1	.....	.....	1	.....	Chicken partly developed; dead from weakness.
" 10..	11	.....	.....	.....	.....	.....	No eggs laid this day.
" 11..	12	1	.....	.....	1	.....	Chicken dead in shell evidently from weakness.
" 12..	13	1	1	.....	.....	.....	Egg without germ; no result.
" 13..	14	.....	.....	.....	.....	.....	No egg laid this day.
" 14..	15	2	2	.....	.....	...	Eggs without germs; no results.
" 15..	16	1	1	.....	.....	.....	" "
" 16..	17	2	2	.....	.....	.....	" "
" 17..	18	.....	.....	.....	.....	.....	No eggs laid this day.
" 18..	19	1	1	.....	.....	.....	Eggs without germs; no results.
" 19..	20	1	1	.....	.....	.....	" "
" 20..	21	1	1	.....	.....	.....	" "
		31	18	2	2	9	

TEST No. 9.—With five White Leghorn hens. Cock bird separated from hens on June 23, 1904. Eggs put into incubator five days later and thereafter for twenty days. Details are as follows:—

Date.	No. of days male bird separated from hens.	No. of eggs set.	Clear eggs. 1st test.	Dead germs.	Dead in shell.	Chickens hatched out.	Remarks.
1904.							
June 28..	5	4	2	.....	.....	2	Strong chickens. Eggs laid 5 days after removal of male bird from hens.
" 29..	6	3	1	1	.....	1	Strong chicken.
" 30..	7	4	1	... ..	.....	3	Strong, healthy chickens. Male bird away from hens seven days.
July 1..	8	2	.....	.....	1	1	Strong, healthy chick. Male bird away from hens eight days.
" 2..	9	3	....	.....	. .	3	Chickens weak; had to be helped out of shells.
" 3..	10	2	.....	.....	.. .	2	Fairly strong and healthy. Male bird away from hens ten days.
" 4..	11	3	2	.....	..	1	Weak and infirm. Male bird away from hens eleven days.
" 5..	12	1	1	.....	.....	.....	Egg without germ. No eggs with germs after this date.
" 6..	13	2	2	.....	.	.. ..	Eggs without germ.
" 7..	14	2	2	.....	.....	... ..	"
" 8..	15	1	1	....	.....	....	"
" 9..	16	2	2	.. ..	.....	...	"
" 10..	17	.....	.....	... .	.....	.....	No eggs laid this day.
" 11..	18	....	.....	.....	. .	.....	"
" 12..	19	1	1	.....	.....	....	No germ in egg.
" 13..	20	1	1	.....	.	..	"
" 14..	21	1	1	.....	. .	.....	"
" 15..	22	1	1	....	.....	...	"
" 16..	23	3	3	.....	..	...	"
" 17..	24	1	1	....	.	.....	"
" 18..	25	3	3	.....	.. .	.....	"
		40	25	1	1	13	

It is interesting to note the result of the two tests. In the first test, No. 8, fertilization was strong enough in 6 eggs laid on the 5th day, after removal of the male bird from the breeding pen, to hatch out two healthy chickens. The last trace of fertilization is found in an egg laid eleven days after removal of the male bird. Examination of this egg, in course of incubation, showed a fairly well developed chicken dead in the shell. It had evidently died in progress of development from weak germination. No further evidence of fertilization is found in this test.

In the second case, test No. 9, strong chickens are hatched from eggs laid on the eighth day after removal of the male bird and fairly strong and healthy chicks from eggs laid on the tenth day after separation. From the three eggs laid on the eleventh day after separation a weak and infirm chicken was hatched. After this there is no trace of fertilization. Results seem to endorse the advice given in reports and correspondence of previous years, to the effect that it is not advisable to set eggs for hatching which are laid on or after the fifth day of removal of male from breeding stock.

Another interesting result which made itself evident was the comparative unimpaired condition of the unfertilized eggs at the conclusion of the 21 days' tests. These unfertilized eggs were taken from the incubator on the 22nd day, after they were put into the machine. During that time they were subject to the ordinary temperature of 103 degrees of heat usually maintained for the hatching of chickens from fertilized eggs. On examination, these unfertilized eggs were found to be in as equally good condition and flavour—if not better in numerous instances—than the majority

of midsummer eggs. This strongly emphasizes the advice so frequently given in previous reports and repeated in a previous page of this one—'that farmers should make it a rule to keep no male bird with the hens which lay the eggs to be taken to market, or, sold to store or middleman.' This experience in relation to the superior keeping quality of unfertilized eggs is by no means a new one in our department. On the occasion of the two tests described above there was good opportunity for extended and correct examination and the results which were so evident in so many cases, not only go to prove the correctness of previous advice, but should be a useful warning to all who are desirous of obtaining the highest price 'for the strictly new laid egg with flavour intact,' more particularly in summer time when conditions for germ development are so favourable.

CARE AND TREATMENT OF THE CHICKENS.

On the chickens hatching out they were allowed to remain in the incubators for 36 or 48 hours—until strong on their legs. If hatched by hens they were allowed to remain under their mothers for the same length of time. The incubator chicks were placed in brooders heated to 95 degrees. If season permitted the brooders were placed on the grass outside and the hens with their chickens were removed to small coops, also on the grass. Each of these coops had a slatted front through which the chicks could run out and in at pleasure. The brooders containing the incubator-hatched chickens were placed in small yards surrounded by portable wire netting fences of light construction. From time to time the brooders and wire fences were moved to new locations, until the chickens were old enough to run at large. When too large for the brooders the chickens were placed in colony houses situated throughout the fields allotted to the department. The same treatment was extended to the hen-hatched chickens on their attaining sufficient size to warrant their removal.

The growth of the chickens was satisfactory. Their rations and treatment were as follows:—First two days, stale bread crumbs and stale bread soak in milk and squeezed dry, the former principally for the first day. On the second or third day granulated oatmeal was given in addition. This may be varied with rice boiled dry, or cracked wheat. After a few days growth finely crushed corn has been found beneficial and was eaten with avidity. A mistake sometimes made is to overfeed the chickens during the early days of their life. As the chickens grew a mash composed of shorts, cornmeal, stale bread and a small quantity of beef scraps or meat meal was mixed with hot milk or water and when cool was fed 3, 4 or 5 times, as occasion required. Small potatoes were sometimes boiled and added to the mash with benefit. Cut bone in small pieces and fed in small quantity at first and after 14 days is one of the best stimulants to vigorous growth that can be given. So are boiled liver and raw onions cut up fine and mixed. In some cases water was furnished from the first day of the chick's life. In others, more particularly the brooder-raised chicks, no water was given at all, the moisture in the milk-soaked bread being considered sufficient. No apparent difference as a result was evident. Grit, from the first was at all times within reach of the youngsters. As the chickens increase in growth the mash was made of as economical and wholesome ingredients as could conveniently be got hold of. Whole grain, principally wheat, was given after the twelfth or fourteenth day, and was gradually increased in proportion as the first and more dainty rations were reduced. The chickens were fed regularly, and while gently pushed, none of their soft food was allowed to remain uneaten, turn sour, or become soiled.

Fed and treated as outlined the weight development of the cockerels of the utility varieties was equal to that of previous years, the average of five years being 1 lb. weight development per month at and after three months of age. The experience of many years has shown with no uncertain results, that with healthy breeding stock carefully fed and cared for chickens, the farmers of the country should find no difficulty in having a pair of Plymouth Rock, Wyandotte, Dorking, or Orping-

ton (the last a comparatively new comer) cockerels, weigh 4 lbs. each, or 8 lbs. per pair, at the end of four months. The latter age is mentioned because it is not so easy to find a pound development per month at an earlier age (in the majority of cases), not because it is unattainable, but for the reason that proper effort is not made to secure such a result.

MANAGEMENT OF MATURING COCKERELS.

On the young cockerels, particularly those of the Mediterranean classes, maturing, they were removed to quarters by themselves, or, they would have annoyed the growing pullets by their precocious attentions.

The larger chickens were also removed from the younger ones when circumstances permitted. This is certainly advisable, for unless removed the older chickens are apt to eat most of the food, and the younger ones are so deprived in great part, if not altogether, of the nourishing food when they most require it. This applies with particular force to late chickens which need to be pushed.

SALE OF BREEDING BIRDS.

During the fall and early winter, a number of Barred and White Plymouth Rock, White Wyandotte and Buff Orpington cockerels were picked out and purchased by farmers and others. It is gratifying to state that the demand was in excess of the supply and may be regarded as evidence of the growing preference by the farmers of the country for birds of good quality and correct market type. There was an equally good demand for eggs for hatching purposes, in early spring and summer, from many different parts of the Dominion.

WEIGHT OF EGGS LAID BY FOWLS OF VARIOUS BREEDS.

Variety.	Number of eggs.	Weight.
White Wyandottes (selected stock)	Per dozen.	1 lb. 13 oz.
" (ordinary stock)	"	1 " 9 "
Black Minoreas (selected birds)	"	1 " 12 "
" (ordinary birds)	"	1 " 9 "
Buff Orpington (selected stock)	"	1 " 13¾ "
" (ordinary)	"	1 " 9 "
Light Brahmas (ordinary)	"	1 " 10¼ "
Black Hamburg (ordinary)	"	1 " 8½ "
Barred P. Rock (ordinary)	"	1 " 8½ "
Faverolle (ordinary)	"	1 " 8¼ "
Silver Grey Dorking (ordinary)	"	1 " 7½ "
Silver Laced Wyandotte (ordinary)	"	1 " 7 "
White P. Rock (ordinary)	"	1 " 7 "
White Leghorns (ordinary)	"	1 " 7 "
Brown Leghorns (ordinary)	"	1 " 4½ "

GENERAL ADOPTION OF TRAP NESTS.

It will be noticed from the foregoing enumeration of the weight of eggs that in several instances they are not as heavy per dozen as outside records have shown. This may be accounted for that on the latter occasions the largest eggs were most likely picked out. In the foregoing table the eggs were taken and weighed as they came, except where it is stated that they were from birds selected, not because they were layers of eggs of extra large size, but for their good all-round points. The Wyandotte and Orpington fowls were picked out because they were of correct market types as well as good layers. And to have this combination should certainly be the aim of every

breeder of the utility varieties. With the view of ascertaining which hens in our poultry houses are the best layers of the largest eggs, trap nests of various patterns have been fitted in the different pens. A few years ago experiments were conducted in our department with trap nests in a rather limited way, but sufficient to show that their use, on a large scale, necessitated increased assistance in order that the work should be correctly done. It is hoped by the more general adoption of trap nests, on the present occasion, to obtain such correct records as will result in the building up of prolific and large egg-laying strains in all varieties and in the case of utility breeds in combination with the best market types. Without such systematic procedure, experience has shown, that all other effort in the same direction is likely to be of a more or less haphazard nature.

THE POULTRY EXHIBIT AT THE CENTRAL CANADA FAIR.

The exhibit of our poultry department at the fair of the Central Canada Association in this city last September, was very successful. The display was made in the farm building in conjunction with other departments. The intention to make the exhibit educational, as well as attractive, was not lost sight of, and with that object in view the following features were conspicuous, viz.:—

Incubators in operation and chickens hatching in them every day.

Brooders also in operation. In them were placed the chickens hatched by the incubators day by day. The chickens did remarkably well.

Hen sitting in nest box of pattern as used in poultry department.

Hen with brood of chickens hatched from eggs laid from 5 to 8 days after separation of male bird from hens.

Models of poultry house suitable for winter, also models of colony houses.

Groups of chickens from 2 to 4 months of age, showing correct market types.

Hens of different breeds and of exceptional good type and quality.

Chickens being fattened in crates, showing crate fattening.

Chickens being fattened, loose in pens.

Dressed poultry, showing birds as they should be sold on the market, or, in shops. Other specimens drawn and trussed ready for the oven.

New-laid eggs from different breeds. And other features of instruction and interest.

DISEASES OF POULTRY.

IMPORTANT IDENTIFICATION OF TUBERCULOSIS IN FOWLS FROM BRITISH COLUMBIA.

During the year many communications were received describing diseases and asking for remedies for the same. Numerous cases were distinguished as colds, catarrh or incipient roup and for which simple remedies were advised. In several instances the symptoms denoted serious ailment. On such occasions the letters were submitted to Dr. C. H. Higgins, Pathologist, Biological Laboratory which is situated on the Experimental Farm. Dr. Higgins expressed his willingness to examine any subjects that might be sent to him, and identify cause of ailment when possible to do so.

LOCATION OF TUBERCULOSIS IN SICK BIRDS FROM BRITISH COLUMBIA.

Early in the month of May last, a letter was received from Mr. George Lawes, of Enderby, B.C., stating that several of his fowls were in a very emaciated condition without any reason for their being so, as they had been well fed and cared for. One

er two had recently died and others seemed as if they would not last long. His letter was submitted to Dr. Higgins, who suggested that if a definite diagnosis was desired by Mr. Lawes that he be requested to send on one or more of the worst specimens. Mr. Lawes, soon after forwarded two sick fowls, and the post mortem examination of one by Dr. Higgins confirmed what from the first was suspected. A copy of his report which was made to the Veterinary Director General, Dr. J. G. Rutherford, and forwarded by that gentleman to our department, is as follows:—

'BIOLOGICAL LABORATORY,
'OTTAWA, May 30, 1904.

'No. 247. This fowl, a Buff Orpington from Geo. R. Lawes, of Enderby, B.C., was chloroformed on the 13th inst. The autopsy revealed lesions of tuberculosis, which cultures and microscopic examinations have confirmed.

'Very nearly all the tissues of the body were invaded by the lesions. The liver was about twice its normal size and contained tubercles varying in size from a pin point to a hazel nut. The spleen was about three times its normal size.

'The lesions of the intestines were of a chronic nature and were without doubt instrumental in communicating the disease to other fowls with which she associated.

(Sgd.) 'CHAS. H. HIGGINS,
'*Pathologist.*'

A copy of this report was mailed to Mr. Lawes with the statement that there was no known cure for tuberculosis among fowls, and that his birds were not likely to recover. Mr. Lawes afterwards wrote that his birds continued to die, one by one, and would likely do so until exterminated.

Such being the deadly nature of the disease it is of vital importance to the poultry keepers of British Columbia that its presence in their province and its fatal character should be known to them. From other points in British Columbia reports of a similar kind to that of Mr. Lawes were received. The correspondents were informed of the results of the examination, and advised to take immediate action upon conclusive identification of the disease, by killing off their birds at once. In one case a reply was received that doubtless the situation was serious, but he would risk consequences. Such a mistaken attitude is to be regretted, for it only postpones the inevitable and renders the stamping out of the disease more difficult.

Dr. D. E. Salmon, Chief of the United States Bureau of Animal Industry, in his book entitled 'The Diseases of Poultry,' writes as follows on the treatment of tuberculosis in a colony of fowls: 'The eradication of tuberculosis in birds from an infected premises can only be attempted with a fair prospect of success when all the birds are sacrificed. Any individuals that are preserved are liable to have ulcerations of the intestines, from which the bacilli are constantly distributed. There should consequently, be no attempt to save any birds from an infected flock. When the birds are all killed and disposed of by burning or deeply burying, the premises should be carefully disinfected.' Then follows detailed instructions as to the proper method of cleaning and disinfecting building and premises. Concluding, Dr. Salmon says: 'After the cleaning and disinfection is accomplished the premises should be opened to the sun and air for a month, if possible, before new birds are introduced.'

Writing of the tuberculous condition of the fowl from Enderby before being killed for examination, Dr. Higgins says: 'There can be no doubt that a fowl infected to such a marked degree must have been a constant menace to all others with which it may have come in contact as countless numbers of baccilli were present in the fæces. This is, I believe, *the first identification of tuberculosis in poultry in Canada.*

Other examinations made by Dr. Higgins are reported as follows:—

218. *A fowl from Experimental Farm Poultry Department.*—Autopsy reveals large tumour on left side of sternum, cystic, the cysts containing fluid dark in colour and gelatinous. Pericardial sac contains 20 cc. fluid. Heart muscle contains nodules,

abdominal cavity contains much semi-fluid gelatinous material. Spleen, liver, lungs and kidneys normal.

A microscopic examination reveals the structure of the tumour as a cystic myxo-sarcoma with metastases in the heart muscle and abdominal cavity.

219. *Buff Orpington Cock.*—Autopsy reveals ulcers in the gizzard with a congestion and thickening of the intestinal mucosa. No parasites were detected in the gizzard. Nematode worms, '*Heterakis differens*' were found in the intestines and cæca. Aside from the lesions mentioned other organs were normal.

220. *Barred Plymouth Rock (Pullet).*—Lesions similar to those noted in former case, but condition not so far advanced. Nematode worms, '*Heterakis differens*' were present in the cæca.

These two cases present an interesting condition and one not usually met with. Before stating definitely the cause, or suspected cause of the trouble, a further investigation will be necessary and other animals examined.

221. *Light Brahma (Pullet).*—This animal was infested with tape worms. '*Drepanidotaenia*': also '*Heterakis differens*,' and the large nematode '*Heterakis inflexa*.

To the tape worms can be ascribed the emaciated condition and general unthriftiness.

247. *Fowl sent from British Columbia.*—Dead upon arrival. Autopsy revealed an extreme impaction of the gizzard, due to six large pieces of broken crockery, the largest of which measured one and one-half centimeters by one centimeter. These were evidently swallowed to assist the digestive functions of the gizzard. No other lesions were observed microscopically.

RATIONS OF LAST WINTER.

The rations fed to the laying stock, other, than those on experiment, during last winter were:—

A. M. ration.—Wheat, sometimes buckwheat in proportion of 8 to 10 pounds to every 100 fowls. This scattered, soon after daylight, in the litter on the floors of the pens.

At 11 a.m.—Steamed lawn clippings, 3 or 4 times per week. This was eaten with evident relish. It is a very beneficial way of utilizing a form of waste. Clover leaves, treated in the same way, are equally effective.

At noon.—A few hands full of grain, if found necessary, thrown on the floor of the pens to keep hens busy.

P.M. ration.—Mash as much as could be eaten up clean 3 or 4 times per week. A liberal allowance was given, for at this time there is less likelihood of injurious effect from overfeeding than at a.m. ration.

The mash was composed of two parts shorts, one part ground oats, one part gluten meal or ground barley. Occasionally small potatoes boiled were added. Sometimes mash was fed at morning ration in lieu of grain. At such time, wheat was given at p.m. ration. Grit, mangels or turnips and water were before the fowls all the time.

Variety in the composition of the rations and in the order of feeding them were found beneficial.

Experience has shown that where there is variety in rations and care in feeding them—with requisite allowance for floor space—there is little likelihood of egg eating, or feather picking.

FLESHING CHICKENS AND FATTENING OLD HENS.

SOME OF WHICH WERE LOOSE IN PENS WITH LIMITED RUN AND OTHERS IN CRATES.

In reports of our department for the past two years will be found interesting and instructive results of the pen and crate methods of fattening chickens, which were conducted by Mr. F. T. Shutt, of the Chemical Division, and his assistants.

The experimental fleshing of chickens and fattening of old hens, during the past season, were conducted by our poultry department. Details are given in following pages.

The terms 'fleshing' and 'fattening' are used with intent, for experience has shown, that rations which are calculated to—and really do—go into 'flesh,' in the case of chickens, are frequently found in the shape of 'fat' in old hens. Experience has also shown that while flesh is desirable, fat—particularly that of old hens—is simply waste. The accumulation of fat in old hens doubtless makes increased weight and may mean a little more money to the seller, but, it is certainly loss to the purchaser, for, it is of no value to him whatever.

On the present occasion, hens of two years of age and chickens of two and three months old, were used.

The experimental fleshing of chickens in our department for several years has shown that before the best specimens can be produced the following preliminary conditions must be thoroughly understood, viz.:—

1. Chickens intended for fleshing should be of correct market types, such as can only come from the utility breeds. Hence the necessity of the parent stock being of proper breed and type.

2. Chickens should be well cared for and properly fed from time of hatching until put into pen or crate for 'finishing.'

3. The better the condition of the chickens when put into pen or crate to flesh the quicker and more complete will the 'finishing' process be.

4. Chickens which have been permitted 'to pick up their own living,' take more food, a longer period to flesh and in the end seldom make specimens that will bring the highest price.

Attention to the foregoing points will certainly bring about the best results.

In the following experiment of Pen vs. Crate, the chickens were divided into five groups and the old hens into one.

Each chicken and hen had a distinguishing number on a metal band round one of its legs.

Except where described the cross-bred chickens were of the ordinary barn-yard type.

The birds were fed twice per day and the rations were made of the consistency of thin porridge.

DETAILS OF EXPERIMENT in Fleshing Chickens in Pens and Crates. August 19, 1904.

Pen or Crate.	No. of birds on hand on Chicken.	Breed.	Cockerel or Pullet.	Age. Months.	Age. Days.	Weight. Beginning of Experiment. Lbs.	Beginning of Experiment. Oz.	1st Week. Lbs.	1st Week. Oz.	2nd Week. Lbs.	2nd Week. Oz.	3rd Week. Lbs.	3rd Week. Oz.	4th Week. Lbs.	4th Week. Oz.	Average at beginning of Experiment. Lbs.	Average at beginning of Experiment. Oz.	Average at close of Experiment. Lbs.	Average at close of Experiment. Oz.	Average total gain by chicken in 4 weeks. Lbs.	Average total gain by chicken in 4 weeks. Oz.	Average gain by chicken in 1 week. Lbs.	Average gain by chicken in 1 week. Oz.
Group No. 1.																							
Pen	16	B. Ply. Rock	C	3	14	3	15	4	11½	5	6	5	14½	6	1								
"	25	"	C	3	14	4	5	4	14½	5	10	6	1	6	6								
"	37	"	C	3	4	3	7	3	12	4	1	4	5	4	9½	4	1½	5	14½	1	12½	0	7⅛
"	52	"	C	3	19	4	14	5	7	6	0	6	8	6	11								
"	62	"	C	3	4	3	9½	3	15½	4	10	5	1½	5	8								
"	72	"	C	3	19	4	9	4	15	5	9	5	14	6	3								
Group No. 2.																							
Crate	20	B. Ply. Rock	C	3	14	4	11	5	1	5	8	5	15	6	1								
"	21	"	C	3	4	3	5	4	0	4	3½	4	7	4	12								
"	31	"	C	3	4	3	1	3	10	4	5	4	15	5	2								
"	63	"	C	3	14	3	8	4	0½	5	0	5	9½	5	15	3	13½	5	8	1	10½	0	6½
"	86	"	C	3	14	4	1	4	5½	4	11½	4	15½	5	3½								
"	95	"	C	3	14	4	5	4	14½	5	2½	5	10	5	14½								
Group No. 3.																							
Pen	91	Crosses	C	3	14	3	4	3	12½	3	12½	4	11	5	0								
"	23	"	C	3	14	3	7	3	15½	3	15½	4	11	5	0								
"	29	"	P	3	0	2	5	2	12	2	15	3	3	3	3½	3	½	4	9½	1	8½	0	6⅝
"	35	"	P	3	4	2	12	3	5	3	5	4	0	4	6								
"	64	"	P	3	14	3	0	3	8	4	1	4	5	4	9								
"	66	"	C	3	14	3	7	4	0	4	10½	5	0	5	4								
Group No. 4.																							
Crate	18	Crosses	C	3	14	3	2	3	5½	3	10	3	14½	4	1½								
"	21	"	C	3	4	2	14½	3	6	3	14½	4	4	4	7½								
"	40	"	P	3	4	2	13	3	3	3	11½	3	14	3	14	3	1½	4	5⅛	1	3⅝	0	4⅞
"	68	"	P	3	14	3	7	3	14½	4	6	4	11	4	12½								
"	87	"	P	3	14	3	1	3	3½	3	8	3	10	3	10½								
"	91	"	C	3	14	3	5	3	13	4	5½	4	14	5	1								

CHICKENS *vs.* OLD HENS IN PEN.

Pen or Crate.	No. of leg band on Chicken or Hen.	Breed.	Cockerel, Pullet or Hen.	Age.		Weight.																Average total gain by chick. on in 4 weeks.		Average gain by chicken in 1 week.	
				Months.	Days.	Beginning of Experiment.		1st Week.		2nd Week.		3rd Week.		4th Week.		Average at beginning of Experiment.		Average at close of Experiment.							
						Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.			Lbs.	Oz.	Lbs.	Oz.
Group No. 5.																									
Pen.	19	B. P. Rock.	C	2	29	2	10	3	1	3	12	4	0	4	3										
"	20	"	C	2	29	2	12	3	2	3	6	4	5	4	11										
"	29	"	C	3	4	3	9	3	14	4	7	4	13	4	15										
"	32	"	C	2	29	2	13	3	7	4	2	4	8	4	12										
"	39	"	C	3	4	3	11	4	3	5	0	5	7	5	9										
"	50	Cross Wh. Wy. & B. L.	C	2	4	2	1	2	8	2	14	3	5	3	9	2	10	4	5	1	11	0	$\frac{11}{16}$		
"	72	"	C	2	4	1	14	2	5	2	15	3	5	3	8										
"	28	S. L. Wy.	C	2	16	2	8	2	14	3	7	3	13	4	2										
"	42	Buff Orp.	C	2	16	2	4	2	11	3	6	3	14	4	3										
"	87	C.W. & B.L.	C	2	16	2	6	2	12	3	5	3	11	3	14										
Group No. 6.		*Old Hens.*																							
Pen.	23	Buff Orp.	H	2	years.	6	6	7	2	7	10	7	13	8	0										
"	27	"	H	2	"	5	2	6	2	6	6	6	9	6	13										
"	38	R. I. R.	H	2	"	4	11	5	1	5	14	6	4	6	5										
"	90	"	H	2	"	5	4	5	15	6	5	6	9	6	9										
"	11	B. P. R.	H	2	"	5	12	6	1	5	15	5	12	5	8										
"	17	"	H	2	"	8	4	8	10	9	2	9	10	9	12										
"	1	W. P. R.	H	2	"	5	7	5	14	6	2	6	3	6	3	5	$8\frac{3}{16}$	6	10	1	$1\frac{7}{16}$	0	$4\frac{15}{16}$		
"	9	"	H	2	"	5	5	6	6	6	6	6	4	6	2										
"	58	Cross Wh. Wy. & Br. Leg.	H	1	"	5	1	5	15	6	2	6	2	6	1										
	64	"	H	1	"	4	8	4	11	4	14	5	0	4	15										

Summary of Results, Pen vs. Crate. Weight, Development, Cost of Production, Profit from Sale of Carcases.

Group No.	Pen or Crate.	Number of Chickens.	Weight. At beginning of experiment. Lbs.	Weight. At beginning of experiment. Oz.	Weight. At close of experiment. Lbs.	Weight. At close of experiment. Oz.	Total increase in four weeks. Lbs.	Total increase in four weeks. Oz.	Cost of Production. Chickens. Initial weight. Lbs.	Chickens. Initial weight. Oz.	Chickens. Value at 10c. per lb. $ cts.	Food. Amount consumed in 4 weeks. Lbs.	Food. Value at 1½c. per lb. cts.	Cost to produce one pound of increase. cts.	Total cost of production. $ cts.	Returns from sale at 13c. per lb. $ cts.	Profit on six chickens, Labour not counted. $ cts.	
																		Rations for 1 and 2 Groups.
1	Pen.	6	24	11	35	6	10	11	24	11	2.47	39	49	4½	2.96	4.60	1.64	Ground oats, 2 parts; ground barley, 1 part; corn meal, 1 part; mixed with skimmed milk.
2	Crate.	6	22	15	33	0	10	1	22	15	2.29	39	49	4¼	2.78	4.29	1.51	
																		Rations for Groups 3 and 4.
3	Pen.	6	18	3	27	6	9	3	18	3	1.82	36	45	4 1/10	2.27	3.56	1.29	Ground oats, 4 parts; ground barley, 2 parts; ground corn, 1 part; meat meal, 1 part; mixed with skimmed milk.
4	Crate.	6	18	10	25	15	7	5	18	10	1.86	36	45	6 1/10	2.31	3.37	1.06	
																		Rations for Groups 5 and 6.
5	Pen.	10	26	8	43	4	16	12	26	8	2.65	58	73	4 3/5	3.38	5.62	2.24	Finely ground oats, 4 parts; ground peas, 1 part; ground corn, 1 part; meat meal, 1 part, mixed with skim milk.
6	"	10	55	3	66	4	11	1	55	3	5.52	54	68	6 1/5	6.20	8.61	2.41	

Results of the foregoing experiments permit of the following deductions:—

The pullets with one exception did not make as great gains as cockerels of the same age.

Old hens which are well fed require no further treatment to make them fit for killing.

The older the hen the more readily does she take on fat rather than flesh.

The cross-bred chickens, although fed on a more nutritive ration, did not make as much weight as pure-bred ones.

The chickens which were loose in their pens with limited run, made slightly greater weight development, at cheaper cost, than those in crates.

STOCK ON HAND.

The following list will show the number, kind and disposition of the different varieties in our poultry houses at the present date, December, 1904:—

Pen No.	Breed.	Cock.	Hens.	Cockerels	Pullets.	Remarks.
1	B. Ply. Rocks	1	12			
2	"	1	12			
3	Wh. "	1	8		4	
4	Buff Orpingtons	1	12			
5	Wh. Leghorns			1	12	
6	S. G. Dorkings	1	12			
7	Black Minorcas			1	11	
8	Wh. Leghorns		12	1		
9	Buff Leghorns		3	1	8	
10	Cock and cockerels	1		3		1 S. S. Hamburg cock, 1 S. S. Wyandotte cockerel, 2 Faverolles.
11	Blk. Minorcas			7		
12	Buff Leghorns			6		
13	Black Hamburgs	1		5		
14	Rock and Wyandottes			6		
15	Capons			7		
16	Black Hamburgs		4	1		
17	" "				7	
18	S. S. "		4		3	
19	Wh. Leghorns				7	
20	S. S. Wyandottes		3		3	
21	Rock and Wyandottes	1		1		1 B. Ply. Rock and 1 Wh. Wyandotte.
22	Faverolles	1	4		6	
23	Blk. Minorcas	1	5			
24	S. G. Dorkings			1	8	
25	L. Brahmas	1	3		3	
26	Crosses				10	
27	"			1	10	
28	Buff Orpingtons			1	10	
29	Wh. Wyandottes		10			
30	Crosses		12			
31	Cockerels			7		2 B. Ply. Rocks, 4 White Ply. Rocks, 1 Wh. Wyandotte.
32	Pullets (late)				12	5 B. Ply. Rocks, 7 crosses.
33	Late cockerels			12		All kinds.
34	B. Ply. Rocks			1	24	
35	Wh. Wyandottes			1	24	

EXPERIMENTAL FARM FOR THE MARITIME PROVINCES.

REPORT OF R. ROBERTSON, SUPERINTENDENT.

NAPPAN, N.S., November 30, 1904.

To DR. WM. SAUNDERS,
Director Dominion Experimental Farms,
Ottawa.

SIR.—I have the honour to submit herewith my annual report of operations on the experimental farm for the maritime provinces at Nappan, N.S.

The season just passed has been the most unfavourable for farm crops of any for some years. Crops generally made a good start, but continued dry weather until the latter part of July, resulted in all farm crops being below the average. Owing to the unfavourable season, and also to the breaking of dykes in the fall of 1903, which caused the marsh to be flooded with salt water, the crop of marsh hay was very much lighter than usual. Clover sown with grain crops made a good start, but almost all died out in July due to lack of moisture. Roots also suffered greatly for want of rain. The red-backed cutworm did considerable damage, especially to the mangel crop, and many fields in the maritime provinces were practically destroyed by this pest. Pastures were exceptionally poor except in the very early part of the season.

I wish to again acknowledge my indebtedness for valuable assistance rendered by Mr. J. Thomas Coates, farm foreman, who has kept all records of crop experiments, and to Mr. R. Donaldson, herdsman, who has kept all records of live stock experiments, each doing so in a careful and painstaking manner.

WEATHER.

The temperature during December was higher than usual, but the snowfall was greater than that for a number of years past. There was quite a fall of snow on the 1st, which, with that on the following day, amounted to about six inches, and made very good sleighing. There was rain and snow on the 3rd, and about twelve inches of snow on the 4th. This made the roads heavy for travel, but soon they were in good condition. The weather continued fine, with occasional snowfalls until the 13th, excepting the 10th, when wind and rain took off some of the snow. The 13th was mild, with rain, which took off much of the snow, making sleighing poor. On the 17th the thermometer went to zero, and on the 18th 4° below zero was registered. The weather kept cold to the 21st, when a thaw with rain took the snow all off. The 22nd was also mild, after which cooler weather continued to the 27th, when the thermometer went to 4° below zero, and 5° below on the 29th, and 2° below on the 30th. It snowed again on the 30th, making good sleighing.

January commenced with very bright cold weather on the 1st and 2nd, when the thermometer registered 10° and 14° below zero on these dates respectively. There was a heavy snow and wind storm on the 3rd and on the 4th, roads had to be broken out in many places. This was followed by light cold weather to the 10th, except a light snowfall on the 8th and 9th. The thermometer registered 11°, 14°, 12°, 2° and 5° below zero on the 3rd, 4th, 5th, 6th and 8th, respectively. From the 10th to the 17th was quite moderate, with occasional falls of snow, and a light rain on the 14th. On the 17th a snow and wind storm blocked the roads again. The weather was fine from this date to the 23rd, when it thawed and some rain fell. The thermometer registered 0°, 15°, 17° and 12° below zero on the 18th, 19th, 20th and 22nd, respectively. There was a sleet storm on the 25th, followed by quite fine cold weather which con-

tinued to the end of the month. The thermometer registered zero on the 26th and 28th, and 3° and 8° below zero on the 29th and 31st, respectively.

February commenced with rain. The thermometer, however, fell below zero the following day, and on the 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th and 10th registered 3°, 3°, 6°, 5°, 29°, 2°, 0°, 3° and 8° below zero respectively. This period was more or less windy with occasional snowfalls. From the 10th to the 14th was fine, with snow on the 15th, which drifted badly on the 16th and 17th. The thermometer registered 10°, 8° and 10° below zero on the 13th, 14th and 15th respectively. On the 19th and 21st the thermometer registered 6° and 15° below zero. There was a rain on the 22nd. The balance of the month was more or less broken by wind and snow storms, and very cold on the 27th and 28th, when the thermometer went to 19° and 16° below zero respectively. The month throughout was much colder than usual.

The thermometer went below zero only three times in March, on the 5th, 6th and 18th, when it registered 1°, 4° and 1° below zero respectively. The first of the month was quite cold, with a thaw on the 3rd, and a wind, rain and lightning on March 4th, which made quite a freshet. It froze up again and remained cold to the 7th, when it moderated, followed by a thaw and rain on the 8th and mild on the 9th. From this time to the 16th the weather was fine and quite cold. From the 16th to the 27th was more or less broken with snow and rain storms, with a thaw on the 26th which took off about all the snow and broke up sleighing. The remainder of the month was fine.

April commenced cold but fine, followed by fine moderate weather to the 9th. Rain fell on the 9th, 10th and 12th. The 14th and 15th were cold and windy, and on the 16th there was quite a fall of snow. The 17th and 18th were fine but cold, and on the 19th nearly an inch of rain fell. This was followed by an unusually heavy snow storm, accompanied by wind which made the snow drift badly. The remainder of April was fine, with warm drying winds, except the last two days, when rain fell. The rainfall for the month was 2·92 inches.

May was fine to the 17th, with the exception of the 10th, when a light rain occurred. On the 17th and 19th 1·23 inches of rain fell. The first seeding was done May 4, and continued to the 17th. From the 19th to the end of the month several small showers are recorded, but seeding continued practically uninterrupted. The month throughout was warmer than usual. Frost is recorded only four times during the month. On the 1st, 2nd, 6th and 7th there was 1°, 5°, 6° and 5° of frost respectively. Vegetation made very rapid growth and the season which appeared backward when May opened was at the close of the month as far advanced as usual. The total rainfall for the month was 1·76 inches.

The month of June was exceptionally dry and fine throughout. The rainfall on the 5th of about ¾ of an inch, and on the 22nd of nearly ½-inch were the only rains of any consequence during the month. The total rainfall for the month was 1·74 inches. The thermometer registered frost on the 9th, and 2° of frost on the 10th, which did considerable damage. The thermometer went to 80° and above three times, on the 21st, 26th and 27th, when 80°, 80° and 82° was registered, respectively. The month throughout was considerably warmer than last year. Crops suffered towards the last of the month for want of rain, and seed of late sown roots did not germinate well.

The month of July was unusually warm, and while 2·15 inches of rain fell; yet, warm drying winds following the showers, none of which were sufficient to more than wet the surface of the ground, quickly dried up the ground again and crops suffered greatly. The thermometer registered above 80° twelve times during the month. The highest temperature was on the 13th, 18th and 29th, when 83° was registered.

The month of August, while warmer somewhat than the previous year, was not as warm as usual. The thermometer only once went to 80°, and that was on the 4th. There was a light rainfall on the 1st, but the early part of the month was entirely too dry for growth, and grain crops especially ripened up prematurely. After the 11th the month was more or less broken, and the rainfall of 1·70 inches on the 21st was the

first one during the season to wet the ground sufficiently for root crops to grow properly. The rainfall during the month was 3·54 inches. There was a heavy wind storm the 23rd, which did considerable damage to crops, especially corn and apples.

There was a heavy rainfall on September 3, 4 and 6, totalling 1·90 inches; also on the 25th of 1·20 inches, and other showers with these brought the month's fall of rain to 4·52 inches. The month, generally speaking, was fine and a good one for getting along with work. The temperature on the average was not as high as last season, and much lower than for the past three years. The highest temperature for the month was recorded on the 15th and 17th, of 77°. There was a heavy wind storm with some rain on the 15th. This was accompanied by very high tides, one of which was increased by the high wind prevailing, and did great damage by running over and breaking a great amount of dyke and flooding marsh lands in this section. The thermometer went to freezing on the 9th, 20th, 22nd and 29th, and there was 1° of frost on the 1st, 9° on the 23rd, and 2° on the 28th.

During the month of October there was one quite heavy rainfall on the 13th of ·97 inches, and a very heavy one on the 22nd of 2·98 inches. Outside of these the month was quite fine, with occasional showers, making the total rain for the month 5 inches. There was more or less frost during the month, and the thermometer went below freezing during 14 nights. The lowest temperature, however, was on the 8th, when 9° of frost was registered.

November commenced with a slight fall of snow, followed by cold weather until the 4th, when there was quite a heavy fall of rain, and a shower on the 6th. The following week was fine but cold, the ground not thawing sufficiently to harvest roots and plough. The 14th commenced wet, followed by snow and wind, and the temperature below freezing. The 16th was milder, followed by colder weather; some snow on the 17th, and rain on the 18th. The weather continued quite fine and moderate until the 26th, with quite a rainfall on the 24th. The 28th and 29th were cold, followed by rain and a thaw on the 30th.

RAINFALL.

April	2·92	inches.
May	1·76	"
June	1·74	"
July	2·15	"
August	3·51	"
September	4·52	"
October	5·00	"
November	3·39	"
Total	24·99	"

METEOROLOGICAL RECORD.

The maximum and minimum thermometrical observations for the year beginning December 1, 1903, and ending November 30, 1904 :—

Month.	Maximum.	Minimum.
1903.		
December	10th 47° above zero.	29th 5° below zero.
1904.		
January	14th 42° above zero.	20th 17° below zero.
February	22nd 43° "	6th 29° "
March	26th 53° "	6th 4° "
April	30th 66° "	4th 9° above zero.
May	9th 75° "	6th 26° "
June	27th 82° "	10th 30° "
July	13th, 18th and 29th, 83° above zero.	9th 45° "
August	4th 80° above zero.	30th 35° "
September	15th and 17th 77° above zero.	23rd 23° "
October	21st 78° above zero.	8th 23° "
November	24th 49° above zero.	29th 12° "

EXPERIMENTS WITH OATS.

Experiments were again continued this year with the leading sorts of oats which were grown in uniform test plots of one-fortieth acre each. Forty-two varieties were included in this test. The plots all received the same treatment and were on soil practically uniform throughout.

The ground was a sandy loam, and was previously in mangels, having been manured for that crop with 30 one-horse cart loads of stable manure per acre. The land was ploughed in the fall after the mangel crop was harvested, and this spring was harrowed twice with the springtooth, and once with the smoothing harrow. The seed was sown May 13, at the rate of 2½ bushels of seed per acre with the seed drill. The ground was also seeded down to clover and Timothy at the rate of 3 pounds Alsike clover, 7 pounds Mammoth Red clover and 12 pounds of Timothy seed per acre by means of a grass seed attachment to the grain drill. The grain used was from heads selected in the field at harvest time before cutting the various plots the previous season, except the variety, Storm King, a new variety originated by Garton Bros., England, seed of which was sent from the Experimental Farm, Ottawa.

No fertilizer was used on these plots this season. The grain started well and made fair growth to the middle of July, when the effect of the continued dry weather was quite apparent. The grain ripened up prematurely, giving a light crop of only fairly well filled oats. The straw was short but stiff, and only a few heads of smut were noticeable. Some slight rust made its appearance early in August. The following yields were obtained from these plots.

OATS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
				In.		In.		Lbs.	Bush.	Lbs.	
1	Swedish Select	Aug.	19 98	36—40	Stiff	6—8	Branching	4,280	72	32	38
2	Siberian	"	22 101	38—42	"	6—8	"	3,600	69	14	35
3	Golden Fleece	"	20 99	33—38	"	5—8	"	4,160	68	8	35
4	Columbus	"	19 98	35—40	Medium	6—7	"	2,800	65	30	36
5	Banner	"	19 98	37—40	Stiff	6—8	"	3,600	64	4	35½
6	Golden Beauty	"	19 98	38—42	"	6—8	"	3,880	63	18	35
7	Golden Tartarian	"	27 106	33—37	"	6—9	Sided	3,520	63	18	34
8	Irish Victor	"	18 97	38—42	"	6—8	Branching	3,200	62	12	36
9	Holstein Prolific	"	20 99	37—41	"	6—8	"	3,480	61	26	36
10	Wide Awake	"	19 98	38—41	"	6—8	"	3,200	61	6	37½
11	Lincoln	"	22 101	33—38	"	6—8	"	3,120	61	6	36½
12	Goldfinder	"	24 103	34—38	"	6—8	"	3,160	61	6	35
13	Waverley	"	18 97	40—46	"	6—9	"	3,320	60	20	36
14	Golden Giant	"	27 106	33—38	"	6—9	Sided	3,880	60	20	33
15	Sensation	"	18 97	38—43	"	6—9	Branching	3,240	60	..	37½
16	White Giant	"	20 99	32—38	"	5—8	"	3,840	60	..	34
17	Improved American	"	22 101	34—39	"	5—8	"	3,920	60	..	34
18	Twentieth Century	"	18 97	36—40	Medium	7—8	"	3,040	59	14	37
19	Pioneer	"	17 96	35—40	Stiff	6—8	"	3,880	58	28	38
20	Abundance	"	20 99	33—38	"	5—8	"	3,840	58	28	35½
21	Thousand Dollar	"	20 99	34—38	"	5—8	"	3,520	57	2	37
22	Joanette	"	17 96	32—36	"	5—7	"	3,200	56	16	36
23	American Beauty	"	19 98	39—43	"	6—8	"	3,320	56	16	35
24	Danish Island	"	24 103	34—40	"	5—8	"	3,880	56	16	34
25	Improved Ligowo	"	18 97	34—40	"	6—8	"	3,600	56	16	37
26	Milford Black	"	20 99	33—38	"	6—8	Sided	3,720	55	10	38
27	Early Golden Prolific	"	19 98	38—42	Medium	6—8	Branching	3,400	55	10	35
28	Bavarian	"	20 99	32—38	Stiff	6—8	"	3,840	55	10	35
29	Kendal White	"	20 99	32—36	"	5—8	Sided	3,080	55	10	36
30	Scotch Potato	"	22 101	38—42	"	6—9	Branching	3,680	54	4	36½
31	Kendal Black	"	20 99	35—40	"	6—8	Sided	3,480	52	32	38
32	Black Beauty	"	17 96	36—41	Medium	7—9	Branching	3,000	51	26	36
33	Tartar King	"	18 97	37—40	Stiff	6—8	Sided	3,160	50	20	39
34	Storm King	"	19 98	32—38	"	6—8	"	3,520	50	20	38
35	Pense Black	"	20 99	33—38	"	5—8	"	3,080	49	14	38
36	Buckbee's Illinois	"	23 102	35—40	"	6—9	Branching	3,240	49	14	36
37	Olive Black	"	20 99	32—38	"	6—8	Sided	3,280	48	8	38
38	Pense White	"	20 99	33—38	"	6—8	"	3,120	48	8	38
39	Milford White	"	20 99	32—37	"	5—8	"	2,680	45	30	38
40	Mennonite	"	24 103	34—38	"	6—8	Branching	3,080	45	30	36
41	Olive White	"	20 99	33—38	"	6—8	Sided	2,920	44	24	38
42	American Triumph	"	27 106	34—39	"	6—9	Branching	3,440	44	24	36

EXPERIMENTS WITH BARLEY.

Twenty varieties of six-rowed and fifteen varieties of two-rowed were sown May 24 in plots of one-fortieth acre each. The land was a sandy loam and was in corn the previous season, for which crop 25 one-horse cart loads of stable manure per acre was used. The ground was ploughed after the corn crop was removed, and this spring was worked up twice with the springtooth harrow and once with the smoothing harrow. The seed sown was from heads selected in the field at harvest time before the plots were cut the previous season.

The grain was sown with the seed drill at the rate of 2 bushels per acre, and 3 lbs. alsike clover, 7 lbs. Mammoth Red Clover and 12 lbs. Timothy seed was sown at the same time. No fertilizer was used this season. The seed germinated well but owing to the drought the straw was short and the yield per acre not up to the average. There was no rust, and very few heads of smut. The following table gives further information respecting this test :—

BARLEY, SIX-ROWED—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	Number of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
				Inches.		Inches.	Lbs.	Bush.	Lbs.	Lbs.
1	Trooper	Aug. 16	84	35—40	Stiff	2 —3	4,720	59	..	48
2	Mensury	" 18	86	35—40	"	2½—3½	4,600	49	8	46
3	Royal	" 23	91	35—40	Medium	2 —2½	4,440	49	8	48
4	Yale	" 24	92	35—40	Stiff	2 —3	3,880	47	..	47½
5	Oderbruch	" 16	84	34—38	Medium	2 —3	4,120	45	40	46½
6	Stella	" 25	93	34—37	Stiff	2 —2½	4,400	45	40	48
7	Rennie's Improved	" 16	84	32—36	"	2 —2½	4,040	45	..	47
8	Empire	" 20	88	35—40	"	2 —3	4,000	45	..	47
9	Summit	" 25	93	34—37	"	2 —2½	3,480	44	8	48
10	Brome	" 20	88	30—33	"	1½—2½	3,360	41	8	46
11	Common	" 16	84	34—37	Medium	2 —3	3,560	43	16	47
12	Odessa	" 16	84	34—38	"	2 —3	3,720	43	16	46½
13	Garfield	" 20	88	35—40	Stiff	2 —3	3,800	42	24	45½
14	Nugent	" 22	90	33—36	"	2 —3	3,840	41	32	47
15	Claude	" 16	84	32—36	Medium	2 —2½	3,600	41	32	46½
16	Albert	" 16	84	33—36	"	2 —3	3,320	40	..	48
17	Baxter	" 16	84	31—35	"	2 —2½	3,040	39	8	46
18	Champion	" 15	83	36—42	"	2½—3½	4,200	38	16	40
19	Mansfield	" 23	91	33—38	Stiff	2½—3¾	3,240	37	24	46
20	Argyle	" 19	87	33—36	"	2 —3	3,160	35	40	47

BARLEY, TWO-ROWED—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	Number of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
				Inches.		Inches.	Lbs.	Bush.	Lbs.	Lbs.
1	Danish Chevalier	Aug. 22	90	32—36	Medium	3 —4	5,000	57	24	50
2	French Chevalier	" 22	90	30—35	"	3 —4	3,880	45	40	49½
3	Dunham	" 22	90	35—40	"	3 —4	4,800	44	8	50
4	Beaver	" 20	88	32—35	"	2½—3½	3,800	42	24	50
5	Logan	" 24	92	35—40	"	3 —4	4,800	41	32	50
6	Harvey	" 24	92	32—36	"	2 —3	3,600	36	32	49
7	Clifford	" 22	90	36—40	"	3½—3½	3,640	35	..	50
8	Sidney	" 22	90	30—35	"	2½—3½	2,880	32	24	49
9	Fulton	" 24	92	34—38	"	2 —3	3,680	32	4	50
10	Invincible	" 24	92	30—35	"	2½—3¼	3,440	31	24	48
11	Standwell	" 24	92	28—33	"	2 —3	2,880	27	24	47
12	Newton	" 24	92	30—34	"	2¼—3	2,640	26	32	47
13	Canadian Thorpe	" 24	92	34—36	Stiff	2 —3	2,400	22	24	49
14	Jarvis	" 20	88	30—36	Medium	2½—3½	2,520	21	32	48
15	Gordon	" 22	90	32—36	Stiff	2 —3	1,800	21	32	48

EXPERIMENTS WITH SPRING WHEAT.

The ground selected for the wheat plots was similar to that on which the oats were grown, and received the same treatment. The seed sown was from heads selected in the field at harvest time before cutting the various plots the previous season. The seed was sown May 12, at the rate of 1¾ bushels per acre with the grain drill, and 3 lbs. Alsike clover, 7 lbs. Mammoth Red clover, and 12 lbs. Timothy seed per acre was sown at the same time.

The plots were one-fortieth of an acre each and thirty-six varieties were included in the test. The seed started well, but owing to the effect of the continued drought the crop was light, and rust early in August did considerable damage to the straw and the grain did not fill out well. The yield per acre and other information obtained from these plots is given in the following table :—

SPRING WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Rusted.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.	
1	Byron	Aug. 20	100	40—44	Stiff	2—3	Bearded	4,600	28	40	60	Slightly.
2	Red Fife	" 24	104	42—47	"	2—3	Beardless	4,800	28	..	59	"
3	White Fife	" 21	101	41—48	"	2—3½	"	4,400	27	20	59	"
4	Rio Grande	" 22	102	43—48	"	2¼—4	Bearded	4,480	27	..	60	"
5	Admiral	" 22	102	44—48	"	2—3	Beardless	3,600	26	40	58½	Badly.
6	Preston	" 20	100	42—44	"	2—3	Bearded	3,400	26	..	59	Slightly.
7	Australian No. 9	" 22	102	40—45	"	2—3	Beardless	3,040	26	..	59	Badly.
8	White Russian	" 24	104	44—47	"	2¼—3½	"	3,920	25	..	60	Slightly.
9	Benton	" 22	102	42—46	"	2½—3½	"	3,720	25	20	59	"
10	Wellman's Fife	" 24	104	43—48	"	2½—3½	"	4,640	25	20	58½	Badly.
11	Dawn	" 22	102	32—36	"	2—3	"	2,840	24	40	59	Slightly.
12	Colorado	" 20	100	42—48	"	2—3	Bearded	3,080	24	40	60½	Medium.
13	Plumper	" 20	100	36—40	"	2—3	"	3,840	24	20	60½	Slightly.
14	Early Riga	" 18	98	38—43	"	2¼—3	Beardless	2,880	24	20	59	"
15	Monarch	" 25	105	40—46	"	2¼—3½	"	2,880	24	20	59½	"
16	Crawford	" 23	103	42—46	"	2—3	"	2,960	24	..	58½	Badly.
17	Huron	" 22	102	42—45	"	2—3	Bearded	3,480	24	..	60	Slightly.
18	Hastings	" 22	102	36—42	Medium	2—3	Beardless	2,920	24	..	60½	"
19	Countess	" 22	102	40—44	Stiff	2—3	"	2,880	23	20	58	"
20	Herisson Bearded	" 22	102	40—44	Medium	1¼—2	Bearded	3,920	23	20	60	"
21	Chester	" 22	102	40—43	Stiff	2—3	Beardless	3,520	23	..	59	"
22	Power's Fife (Minn. 149)	" 22	102	40—45	"	2—3	"	2,880	22	40	59½	"
23	Red Fern	" 22	102	42—46	"	2¼—3½	Bearded	2,960	22	40	59	"
24	Laurel	" 25	105	45—48	"	3—4	Beardless	3,880	22	20	59	"
25	Pringle's Champlain	" 20	100	45—48	"	2¼—3¾	Bearded	3,120	22	..	60	"
26	Advance	" 22	102	40—44	"	2—3	"	2,520	21	40	59	Badly.
27	Hayne's Blue Stem (Minn. 169)	" 24	104	40—44	"	2¼—4	Beardless	2,640	21	40	59	Slightly.
28	Clyde	" 22	102	38—42	"	2½—4	"	2,760	21	20	58	"
29	Hungarian	" 22	102	40—42	Medium	2—3	Bearded	3,200	21	20	60	"
30	Australian No. 19	" 22	102	36—40	Stiff	2—3	Beardless	2,440	21	..	59	Badly.
31	Weldon	" 22	102	40—45	"	2—3¼	"	2,280	20	40	59	Slightly.
32	Stanley	" 24	104	42—46	"	2—3½	"	4,240	20	20	59½	"
33	Fraser	" 20	100	34—40	Medium	2—2½	Bearded	2,680	20	..	59	"
34	Minnesota No. 163	" 21	104	39—43	Stiff	2—3½	Beardless	2,480	20	..	59	"
35	McKendry's Fife (Minn. 181)	" 24	104	40—45	"	2—3½	"	3,440	20	..	59	"
36	Percy	" 23	103	43—47	"	2—3½	"	1,080	18	40	58	Badly.

EXPERIMENTS WITH MACARONI WHEAT.

Four varieties of Macaroni wheat were sown. These were grown in plots of one-fortieth acre each, alongside the other wheat plots. The ground was similar and received similar treatment to the wheat plots and was sown at the same time, but the crops of grain harvested were light. A well-known variety of Macaroni wheat is that called 'Goose.' The reason for putting these wheats in a separate table is on account of their inferior milling qualities, as their growth for bread-making would prove unsatisfactory. The following table gives the yield per acre and other information respecting these plots:—

MACARONI WHEAT— TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Rusted.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.	
1	Goose	Aug. 22	102	33—38	Medium	2 —2½	Bearded	2,280	16	..	61	Slightly.
2	Yellow Gharnovka	" 24	104	36—40	"	2 —2½	"	2,520	14	..	61	Very slightly.
3	Roumanian	" 24	104	36—40	"	2 —2½	"	.....	13	20	62	Slightly.
4	Mahmoudi	" 24	104	30—36	Weak	1½—2½	"	.....	8	..	60	Very slightly.

EXPERIMENTS WITH EMMER AND SPELT.

Two varieties of Emmer and two varieties of Spelt were sown in plots of one-fortieth acre each May 12. The land was similar to and received the same treatment as that on which the other wheats were grown. These varieties are separated from the bread wheats for the reason that they are useful principally for grinding for stock feed, and from the fact that in ordinary threshing the chaff is not separated from the kernels. The yield of these plots is given in pounds for the reason that this grain in the chaff cannot fairly be compared with other sorts of wheat which are threshed clean.

EMMER AND SPELT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.	Weight per Bushel.	Proportion Rusted.
				In.		In.		Lbs.	Lbs.	Lbs.	
1	Red Spelt	Aug. 30	110	36—42	Stiff	2 —3¼	Beardless	3,120	1,400	30	Badly.
2	White Spelt	" 30	110	37—43	"	3½—5	"	.....	1,120	33	"
3	Common Emmer	" 22	102	28—33	Weak	1½—2	Bearded	2,280	1,046	40	Slightly.
4	Red Emmer	" 30	110	35—40	Stiff	2½—3	"	2,200	1,000	35	"

EXPERIMENTS WITH FIELD PEASE.

The land on which the pease were sown was a clay loam, and was previously in clover and timothy. The land was not in a fertile condition. The only fertilizing it ever received was a crop of green pease ploughed under in 1901, and an application of marsh mud in 1902. The sod was ploughed in the fall and this spring was worked up once each with the disc, spade, and springtooth harrows. No fertilizer was used. The seed was sown with the seed drill at the rate of from 2 to 3 bushels per acre according to the size of the pea. Mammoth Red clover at the rate of 10 lbs. per acre was also sown. The plots were one-fortieth acre each. Thirty-one varieties were sown May 28. The growth of vine was short, and the yield per acre small. The following particulars were obtained from these plots:—

PEASE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.		Weight per Bushel.
					In.	In.		Bush.	Lbs.	Lbs.
1	Prince Albert	Sept. 5..	100	Strong....	35—40	1½—2	Small...	36	40	60
2	Carleton	" 5..	100	Medium..	32—36	2 —2¼	Medium	36	..	60
3	Agnes	" 5..	100	Strong....	38—42	2 —3	Large ..	34	..	61
4	Archer	" 5..	100	"	36—40	2 —2½	Medium	33	20	60½
5	Nelson	Aug. 30..	94	Medium..	30—34	2 —2¼	"	33	20	61
6	King	" 30..	94	" ..	35—40	2 —2½	"	32	..	61
7	Macoun	Sept. 5..	100	Strong....	35—40	2 —3	Large .	31	20	60
8	Golden Vine	Aug. 30..	94	Medium..	32—36	1½—2	Small...	31	20	61
9	Pride	Sept. 2..	97	" ..	30—36	2 —2¼	Medium	30	40	61
10	Victoria	" 7..	102	Strong....	35—40	2 —3	Large...	30	40	58
11	Prince	" 5..	100	"	36—41	2 —2½	Medium	29	..	60
12	Gregory	" 5..	100	" ...	36—40	2 —2½	Large ..	28	40	60
13	Large White Marrowfat	" 2..	97	"	36—42	2 —3	" ..	28	..	61
14	Mackay	" 5..	100	"	33—38	2 —2½	" ..	28	..	60
15	Crown	Aug. 30..	94	Medium..	30—34	1½—2	Small...	27	20	63
16	Chancellor	" 30..	94	" .	24—28	1½—2	" ..	26	40	60
17	Duke	Sept. 2..	97	" ..	28—33	2 —2¼	Medium	26	.	61
18	German White	Aug. 30..	94	" ..	25—30	1½—2	Small...	26	..	62
19	Black eyed Marrowfat	Sept. 5..	100	" ..	35—40	2 —3	Large ..	25	20	61
20	Picton	" 5..	100	" ..	30—40	2 —2¼	Medium	25	..	61
21	Pearl	" 5..	100	" ..	30—36	2 —2¼	"	24	40	59
22	Arthur	Aug. 30..	94	" ..	30—33	2 —2½	"	24	..	62
23	Wisconsin Blue	" 31..	95	" ..	30—33	1½—2¼	"	24	..	62
24	Daniel O'Rourke	" 29..	93	" ..	32—36	1½—2	Small..	23	20	62
25	Mummy	" 31..	95	" ..	30—33	2 —2½	Medium	22	40	62
26	Kent	Sept. 5..	100	" ..	35—40	2 —2½	Large...	22	40	60½
27	English Grey	Aug. 30..	94	" ..	24—30	2 —2¼	Medium	21	20	61
28	Early Britain	" 30..	94	" ..	28—32	1½—2	"	20	40	61
29	Paragon	" 29..	93	Poor	24—30	1½—2	"	20	..	62
30	Prussian Blue	" 30..	94	Medium..	28—33	2 —2¼	Small...	19	20	61
31	White Wonder	" 29..	93	Poor	24—26	2 —2½	Medium	12	40	62

EXPERIMENTS WITH BUCKWHEAT.

Five varieties of buckwheat were sown June 11, with the seed drill. The plots were one-fortieth of an acre each. They were cut September 5. The soil was a clay loam and had clover and timothy as a previous crop. The land was not in a fertile condition. The only fertilizing it ever received was a crop of green pease ploughed under in 1901, and an application of marsh mud in 1902. The sod was ploughed in the fall and worked up this spring by going over it twice with the springtooth, and once each with the spade and smoothing harness. The following yields per acre were obtained:—

BUCKWHEAT—TEST OF VARIETIES.

Name of Variety.	Yield per Acre.		Weight per Bushel.
	Bush.	Lbs.	Lbs.
Siberian or Tartarian	29	8	49
Silverhull	22	24	50
Grey	21	32	49
Rye	21	32	52
Japanese	15	..	48

FIELD CROPS OF GRAIN.

Four acres of grain were sown in acre plots, May 30. The land was a light clay loam and was previously in corn, having been manured for that crop with 30 one-horse cart loads of stable manure per acre. The ground was ploughed this spring and worked up with the springtooth and smoothing harrows. The seed was sown with the seed drill. One acre was in barley, sown at the rate of two bushels of seed per acre; one acre White oats and one of Black oats sown at the rate of three bushels per acre, and one acre of mixed grain, made up of two bushels Sensation oats, one bushel of Odessa barley and one peck Golden Vine pease, sown at the rate of three bushels per acre. The land was also seeded down to clover and Timothy. The following table gives the yield per acre, and varieties used:—

Name of Variety.	When Cut.	Weight per Bushel.	Yield per Acre.	
		Lbs.	Bush.	Lbs.
1 acre Odessa barley	Aug. 22	48	27	26
1 " Sensation oats	Sept. 3	37	56	25
1 " Black Tartarian oats	" 7	34	40	27
1 " mixed grain	Aug. 30	42	47	13

FIELD CROP OF MIXED GRAIN—FERTILIZER EXPERIMENTS.

Six half-acre plots were sown with mixed grain. The land was in a poor state of fertility. It was previously in clover and Timothy, which sod was ploughed last fall. The seed was sown May 30, and was made up of Sensation oats, two bushels; Odessa barley, one bushel; and Golden Vine pease, one peck; mixed together and sown at the rate of three bushels seed per acre.

The ground was worked up with the spade, springtooth, and smoothing harrows, and the seed sown with the seed drill. Fertilizers were sown on four of these plots by means of a fertilizer attachment to the seeder, and two were left without fertilizers. The crop was cut August 5, and the following yield per acre obtained:—

FIELD CROP OF MIXED GRAIN—FERTILIZER EXPERIMENTS.

Size of Plot and Fertilizer Used.	Yield per Acre.	
	Bush.	Lbs.
½ acre; no fertilizer used	26	..
½ acre; Pidgeon's Fine Ground Bonemeal, 250 lbs. per acre	35	..
½ acre; 'Imperial' brand fertilizer, 250 lbs. per acre	33	..
½ acre; no fertilizer used	28	..
½ acre; Pidgeon's Fine Ground Bonemeal, 250 lbs. per acre	34	..
½ acre; 'Imperial' brand fertilizer, 250 lbs. per acre	34	20

FIELD CROP OF MIXED GRAIN.

One field of six acres was seeded to mixed grain, May 14. Three pounds of Alsike, 7 pounds of Mammoth Red clover and 12 pounds of Timothy seed per acre were also sown at the same time. The land is a clay loam, and was previously in clover, being in grain in 1902, and in roots in 1901, for which crop, stable manure at the rate of 25 one-horse cart loads per acre was used. The ground was in a fair state of fertility. The crop was cut August 17, and the field yielded at the rate of 45 bushels per acre, weighing 42 pounds per bushel. The field was seeded at the rate of three bushels per acre with seed made up as follows:—Susation oats, 2 bushels; Odessa barley, 1 bushel; Golden Vine pease, 1 peck mixed together.

FIELD CROP OF OATS ON MARSH LANDS.

Three acres of oats were sown May 16 on marsh land that had been ploughed the previous fall. This was seeded broadcast by hand and Timothy and clover seed was also sown. The dry summer was particularly disastrous to marsh grain crops. The ground became hard and dry and very little growth was made after the early part of July. On account of the dykes breaking in the fall of 1903 this land was flooded by tide water, which may also have had a tendency to decrease the yield. The grain was cut August 22, and gave a total yield of 80 bushels or an average yield of 26 bushels, 21 pounds per acre.

FIELD CROP OF BUCKWHEAT.

Five acres of buckwheat was sown on land three acres of which had been in rape last year, and two acres in sand vetch. These two crops made light growth, and were pastured to sheep. This ground is practically new land in a poor state of fertility, and has been used as a sheep pasture for years. It was ploughed this spring and was worked up with the springtooth and smoothing harrows and seeded to buckwheat at the rate of 1¼ bushels per acre, on June 16. The crop was harvested September 7. The yield from this field was 64 bushels, or averaging hardly 13 bushels per acre.

EXPERIMENTS WITH INDIAN CORN.

The soil chosen for the corn plots is a light clay loam. The previous crop was turnips, for which crop 35 one-horse cart loads of stable manure per acre was applied. The ground was not ploughed last fall. It was worked up this spring first with the spade harrow and then manured at the rate of 15 one-horse cart loads of stable manure per acre, which was ploughed under and again worked up with the spade harrow, followed by the springtooth and smoothing harrows. Complete fertilizer at the rate of 400 pounds per acre was sown along the rows and hills when the seed was planted.

The seed was planted in hills and rows June 1. One set of plots was in hills 3 feet apart each way, and from 4 to 6 plants were left in a hill, and the other was in rows 3 feet apart and the plants were thinned to about 6 inches apart. There were twenty varieties included in this test. The crop was harvested and weighed September 28. The yield per acre is calculated from the weight obtained from two rows each 66 feet long. The wind storm of August 23 and frost September 1 did some damage to those plots, after which they made little growth.

INDIAN CORN—TEST OF VARIETIES.

Number.	Name of Variety.	Height.	When Tasselled.	In Silk.	Condition when cut.	Weight per acre grown in rows.		Weight per acre grown in hills.	
		Inches.				Tons.	Lbs.	Tons.	Lbs.
1	Thoroughbred White Flint	85	Sept. 20		Tasselling	20	1,630	17	870
2	Salzer's All Gold	94	Aug. 31	Sept. 9	Silked	20	700	15	250
3	Red Cob Ensilage	98	" 31	" 20	"	17	870	17	650
4	Pride of the North	102	" 31	" 20	"	17	320	14	270
5	Superior Fodder	84	Sept. 9		Tasselling	17	100	15	20
6	King Philip	90	Aug. 15	Aug. 25	Soft glazed	15	1,900	15	1,350
7	Longfellow	84	" 10	" 20	Glazed	15	1,680	14	1,150
8	Eureka	95	" 31		Silked	15	1,350	14	1,700
9	Giant Prolific Ensilage	97	Sept. 5		"	15	800	13	1,830
10	Evergreen Sugar	86	Aug. 15	Aug. 25	Watery	15	800	12	200
11	Angel of Midnight	86	" 10	" 20	Glazed	14	1,480	15	140
12	White Cap Yellow Dent	100	" 23	" 31	Watery	14	930	12	970
13	Early Butler	78	" 30		Silked	14	490	10	1,230
14	Compton's Early	80	" 10	Aug. 20	Glazed	13	1,500	11	770
15	Early Mastodon	82	" 27	Sept. 5	Silked	13	950	12	750
16	Cloud's Yellow Dent	96	" 25	" 20	"	12	1,850	11	1,100
17	Champion White Pearl	96	" 27	" 3	Watery	12	750	10	1,120
18	North Dakota	72	" 13	Aug. 27	Soft glazed	11	1,650	10	350
19	Mammoth Cuban	80	" 27	Sept. 5	Silked	11	1,430	11	1,850
20	Selected Leaming	88	" 25	" 15	"	10	350	8	1,270

FIELD CROP OF CORN—FERTILIZER EXPERIMENTS.

Three acres of corn was planted in rows 3 feet apart, June 10, on a soil of a light clay loam character. One-third running across one end of the field was in clover the previous year; in grain in 1902, and roots in 1901, for which crop 30 one-horse cart loads of stable manure was used per acre. One-third running across the centre of the field was in grain last year, having been manured in 1902 for roots at the rate of 35 one-horse cart loads per acre, and one-third running across the other end of the field was in roots last year, having been manured for that crop with 35 one-horse cart loads of stable manure per acre. The rows ran lengthwise of the field across each of these three differently treated pieces of the field. The two former, clover and grain stubble, were ploughed the fall previous, and the third, on which roots were grown, was not ploughed in the fall. This spring the whole field was worked up by going over it once each with the disc and spade harrows, after which stable manure at the rate of 20 tons per acre was scattered broadcast with the manure spreader and ploughed under. The ground was again gone over with the spade, springtooth and smoothing harrows, and put into good tilth.

Four varieties of corn of $\frac{3}{4}$ acres each were planted. One-third of each variety was fertilized in addition to the manure with 400 lbs. of fertilizer per acre; one-third with 200 lbs. per acre, and the other third manure only. The fertilizer was scattered broadcast and harrowed in. Each plot of $\frac{1}{4}$ acre was six rows running the entire length of the field.

The first frost on September 1, which was much earlier than usual, damaged the crop slightly; while a severe frost on September 23 of 9° did considerable damage, and very materially reduced the yield per acre. The following table gives the name of variety sown, how treated, and yield per acre:—

FIELD CROP OF CORN—FERTILIZER EXPERIMENTS.

Name of Variety, how fertilized, size of plot, and when cut.	Yield per Acre.	
	Tons.	Lbs.
Angel of Midnight.		
Cut Sept. 27th.		
¼ acre—Manure and Bowker's 'Square' brand fertilizer, 400 lbs. per acre	13	420
¼ " " " " 200 " "	12	600
¼ " Manure only, 20 tons per acre	11	1,560
Compton's Early.		
Cut Sept. 30th.		
¼ acre—Manure and Bowker's 'Square' brand fertilizer, 400 lbs. per acre	12	40
¼ " " " " 200 " "	11	1,720
¼ " Manure only, 20 tons per acre	11	1,660
Longfellow.		
Cut Sept. 29th.		
¼ acre—Manure and Bowker's 'Square' brand fertilizer, 400 lbs. per acre	11	760
¼ " " " " 200 " "	10	1,960
¼ " Manure only, 20 tons per acre	12	1,100
South Dakota.		
Cut Sept. 29th.		
¼ acre—Manure and Bowker's 'Square' brand fertilizer, 400 lbs. per acre	12	360
¼ " " " " 200 " "	12	1,700
¼ " Manure only, 20 tons per acre	12	40

CORN SOWN AT DIFFERENT DISTANCES APART.

Experiments were again conducted this year with corn planted in rows at different distances apart. Three varieties of corn were used. The corn was planted June 13 and harvested October 4. The plots were each one-fortieth acre. The ground was similar to that on which the field corn was grown and received the same cultivation and the same amount of manure per acre. In addition to this 400 lbs of complete fertilizer per acre was used on these plots. The yield was as follows:—

Name of Variety.	Distance Apart.	Yield per acre.	
	Inches.	Tons.	Lbs.
Selected Leaming	42	5	293
" "	35	5	1,550
" "	28	7	350
" "	21	8	1,860
Longfellow	42	9	1,552
"	35	12	750
"	28	13	1,335
"	21	14	1,798
Champion White Pearl	42	7	758
" "	35	9	1,200
" "	28	11	1,714
" "	21	12	1,756

EXPERIMENTS WITH TURNIPS.

The land chosen for the turnip plots was in grain the previous season, having been in roots in 1902, for which crop 30 one-horse cart-loads of stable manure per acre was used. It was ploughed in the fall and worked up this spring once with the spade harrow and manured at the rate of 25 one-horse cart-loads of stable manure per acre and ploughed. This was worked up with the spade harrow again and once with the springtooth. Complete fertilizer at the rate of 400 lbs. per acre was sown broadcast, and harrowed in with the smoothing harrow. The ground was run into rows 24 inches apart. The rows were raked off by hand, and the plots planted with the Planet Jr., seed drill No. 5. The plants were thinned to about one foot apart in the rows. The soil was a light clay loam. The plots were sown May 30, and a duplicate set planted June 13. Twenty varieties were included in the test. The crops on both sets of plots were pulled October 24, and the yield per acre calculated from the weight obtained from 2 rows each of 66 feet long. Continued dry weather from the time of sowing up to July 21 resulted in the plants making poor progress. Some plants were destroyed by cut-worms. The latter part of the season was favourable for growth.

TURNIPS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre 1st Plot Sown.		Yield per Acre 1st Plot Sown.		Yield per Acre 2nd Plot Sown.		Yield per Acre 2nd Plot Sown.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Perfection Swede	40	335	1,339	15	34	1,300	1,155	..
2	Jumbo	39	375	1,306	15	35	785	1,179	45
3	Good Luck	38	1,880	1,298	..	35	125	1,168	45
4	Carter's Elephant	38	1,220	1,287	..	32	350	1,072	30
5	Hartley's Bronze	38	625	1,277	5	34	475	1,141	15
6	Emperor Swede	37	1,900	1,265	..	35	950	1,182	30
7	Selected Purple Top	37	1,735	1,262	15	30	1,875	1,931	15
8	Kangaroo	37	745	1,245	45	33	1,980	1,133	..
9	Drummond Purple Top	37	250	1,237	30	31	1,855	1,064	15
10	Magnum Bonum	36	1,125	1,223	45	34	145	1,135	45
11	Mammoth Clyde	35	1,775	1,196	15	33	825	1,113	45
12	Hall's Westbury	35	950	1,182	30	33	1,650	1,127	30
13	Sutton's Champion	35	785	1,179	45	33	1,155	1,119	15
14	Halewood's Bronze Top	35	455	1,174	15	33	..	1,100	..
15	Imperial Swede	34	1,300	1,155	..	31	700	1,045	..
16	Skirvings	33	1,980	1,133	..	28	925	948	45
17	Bangholm Selected	32	1,175	1,086	15	28	255	937	35
18	Elephant's Master	31	1,855	1,064	15	33	495	1,108	15
19	New Century	31	295	1,036	45	31	1,525	1,058	45
20	East Lothian	30	1,545	1,025	45	29	575	976	15

FIELD CROP OF TURNIPS—FERTILIZER EXPERIMENTS.

Seven acres of turnips were sown June 10 and 14 on soil of a light clay loam character. The soil was the same as that on which the field corn and mangels were grown. One-third running across one end of the field was in clover the previous year, in grain in 1902, and roots in 1901, for which crop 30 one-horse cart-loads of stable manure per acre was used. One-third running across the centre of the field was in grain last year, having been manured in 1902 for roots at the rate of 35 one-horse cart-loads per acre, and one-third running across the other end of the field was in roots last year, having been manured for that crop with 35 one-horse cart-loads of stable manure per acre. The rows ran lengthwise of the field across each of these three differently treated pieces of land. The pieces on which clover and oats were grown

were ploughed last fall, and the root piece was not ploughed until this spring. This spring the whole field was worked up by going over it once each with the disc and spade harrows, after which stable manure at the rate of 20 tons per acre was scattered broadcast with the manure spreader and ploughed under. The ground was again gone over with the spade, springtooth, and smoothing harrows and put into a good state of tilth.

Five acres were sown with a different variety for each acre. One-third of each acre was fertilized in addition to the manure (20 tons per acre) with Bowker's square brand complete fertilizer, at the rate of 500 lbs. per acre; one-third 250 lbs. per acre, and another one-third of each manure only. Two additional acres were sown with one variety. On one-third of each acre there was added to the manure fertilizers at the rate of 1,000 lbs. per acre; one-third of each acre at the rate of 500 lbs. per acre, and one-third of one acre was left for manure only, and one-third of the other acre was given an additional coat of 20 tons stable manure per acre, making a total of 40 tons. Each plot was 8 rows running the entire length of the field, or one-third of an acre. The first part of the summer was so extremely dry that the roots made poor growth. They made fair growth after the first of August. The cutworm also did considerable damage. The following table gives the name of variety sown, how treated, date of harvesting and yield per acre:—

FIELD CROP OF TURNIPS—FERTILIZER EXPERIMENTS.

Name of Variety, how Fertilized, size of Plot, and date when pulled.	Yield per Acre.		Yield per Acre.	
Hartley's Bronze Top.	Tons.	Lbs.	Bush.	Lbs.
(Pulled October 21.)				
⅓ acre—Manure and Bowker's 'Square' brand fertilizer, 500 lbs. per acre..	28	55	934	15
⅓ " " " " 250 " ..	27	1,725	928	45
⅓ " " alone, 20 tons per acre..	24	285	804	45
Purple Top Swede.				
(Pulled October 20.)				
⅓ acre—Manure and Bowker's 'Square' brand fertilizer, 500 lbs. per acre..	20	785	679	45
⅓ " " " " 250 " ..	21	1,770	729	30
⅓ " " alone, 20 tons per acre.....	21	630	710	30
Carter's Elephant.				
(Pulled November 16.)				
⅓ acre—Manure and Bowker's 'Square' brand fertilizer, 500 lbs. per acre..	25	1,015	850	15
⅓ " " " " 250 " ..	26	935	882	15
⅓ " " alone, 20 tons per acre....	24	1,140	819	..
Kangaroo.				
(Pulled October 19.)				
⅓ acre—Manure and Bowker's 'Square' brand fertilizer, 500 lbs. per acre..	21	405	706	45
⅓ " " " " 250 " ..	20	770	679	30
⅓ " " alone, 20 tons per acre.....	18	285	604	45
Empress Swede.				
(Pulled October 21.)				
⅓ acre—Manure and Bowker's 'Square' brand fertilizer, 500 lbs. per acre .	19	565	642	45
⅓ " " " " 250 " ..	19	976	649	36
" " alone, 20 tons per acre.....	17	1,760	596	..

FIELD CROP OF TURNIPS—FERTILIZER EXPERIMENTS.—*Concluded.*

Name of Variety, how Fertilized, size of Plot, and date when pulled.	Yield per Acre.		Yield per Acre.	
	Tons.	Lbs.	Bush.	Lbs.
Purple Top Swede.				
(Pulled November 7.)				
⅓ acre—Manure and 'Thomas' Phosphate Powder, 1,000 lbs per acre	28	250	937	30
⅓ " " " " 500 "	28	925	948	45
⅓ " " alone, 20 tons per acre	26	1,175	886	15
Purple Top Swede.				
(Pulled November 2.)				
⅓ acre—Manure and Pidgeon's 'Intense' brand fertilizer, 1,000 lbs. per acre	26	1,870	897	30
⅓ " " " " 500 "	24	1,230	820	30
⅓ " " alone, 40 tons per acre	27	1,275	921	15

EXPERIMENTS WITH MANGELS.

The ground selected for the mangel plots was a light clay loam. It was in clover the previous year, in grain in 1902, and in roots in 1901, for which crop 30 one-horse cart loads of stable manure per acre was used. The clover sod was ploughed last fall and this spring was worked up with the spade harrow and manured with 25 one-horse cart loads of stable manure per acre, which was ploughed in and worked up with the spade and springtooth harrows. Complete fertilizer at the rate of 400 lbs. per acre was sown broadcast and harrowed in with the smoothing harrow, after which rows were run 24 inches apart. The plots were sown May 30, and a duplicate set on June 13. The rows were raked off and the seed sown with the Planet Jr., hand seed drill. The crop was harvested October 12. The yield per acre has been determined from the weight obtained from two rows, each 66 feet long. The mangel crop suffered considerably from the ravages of the cutworm. The early-sown plot of Prize Winner Yellow Globe was so badly destroyed that reliable weights could not be obtained. The continued dry weather until after the middle of July also prevented satisfactory growth, while the latter part of the season was fairly suitable.

MANGELS—TEST OF VARIETIES.

No.	Name of Variety	Yield per Acre. 1st Plot Sown.		Yield per Acre. 1st Plot Sown.		Yield per Acre. 2nd Plot Sown.		Yield per Acre. 2nd Plot Sown.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Yellow Intermediate	40	1,015	1,350	15	31	1,525	1,058	45
2	Mammoth Yellow Intermediate	36	435	1,207	15	30	1,380	1,023	
3	Lion Yellow Intermediate	33	660	1,111		31	535	1,042	15
4	Giant Yellow Intermediate	33	495	1,108	15	27	285	904	45
5	Giant Sugar Mangel	28	1,090	951	30	24	530	808	50
6	Half Long Sugar White	26	305	871	45	25	490	841	30
7	Half Long Sugar Rosy	25	1,810	863	30	24	510	808	30
8	Leviathan Long Red	25	490	841	30	21	900	715	
9	Giant Yellow Globe	22	1,870	764	30	22	550	742	30
10	Selected Yellow Globe	22	1,540	759		21	735	712	15
11	Prize Mammoth Long Red	21	1,395	723	15	24	1,605	816	45
12	Selected Mammoth Long Red	20	1,085	684	45	20	590	676	30
13	Gate Post	20	425	673	45	25	1,480	858	
14	Mammoth Long Red	19	1,600	660		18	630	610	30
15	Triumph Yellow Globe	19	280	638		19	610	643	30
16	Prize Winner Yellow Globe					15	855	514	15

FIELD CROP OF MANGELS—FERTILIZER EXPERIMENTS.

Four acres of mangels were sown June 4 and 9 on soil of a light clay loam character. This land was adjoining that on which the corn and turnips were grown. One-third running across one end of the field was in clover the previous year, in grain in 1902, and in roots in 1901, for which crop 30 one-horse cart loads of stable manure per acre was used. One-third running across the centre of the field was in grain last year, having been manured in 1902, for roots, at the rate of 35 one-horse cart loads per acre, and one-third running across the other end of the field was in roots last year, having been manured for that crop with 35 one-horse cart loads of stable manure per acre. The rows ran lengthwise across each of these differently treated pieces of the field. The pieces on which clover and oats were grown last year were ploughed in the fall, but the root piece was not ploughed until this spring. This spring the whole field was worked up by going over it once each with the disc and spade harrows, after which stable manure at the rate of 20 tons per acre was scattered broadcast with the manure spreader and ploughed under. The ground was again gone over with the spade, springtooth, and smoothing harrows, and put into a good state of tilth.

Four varieties of mangels were sown. One-third acre of each was fertilized, in addition to the manure, with 500 pounds of fertilizer per acre. One-third with 250 pounds of fertilizer per acre in addition to the manure, and the other third, manure only. The fertilizer was scattered broadcast before the land was run up into rows 24 inches apart. The seed was sown with the hand seed drill in bunches one foot apart. Each plot was one-third acre, or eight rows running the entire length of the field. This field did not make a satisfactory growth, owing to the extremely dry weather prevailing during the first part of the season. The later growth was fair. The cutworm did considerable damage. The following table gives results obtained.

FIELD CROP OF MANGELS—FERTILIZER EXPERIMENTS.

Name of Variety, how Fertilized, size of Plot and date when pulled.	Yield per Acre.		Yield per Acre.	
Mammoth Long Red.	Tons.	Lbs.	Bush.	Lbs.
(Pulled October 13.)				
⅓ acre—Manure and Bowker's 'Square' brand fertilizer, 500 lbs. per acre...	14	80	468	..
⅓ " " " " 250 " ..	13	1,795	463	15
⅓ " " alone, 20 tons per acre.....	12	585	409	45
Giant Yellow Half Long.				
(Pulled October 17.)				
⅓ acre—Manure and Bowker's 'Square' brand fertilizer, 500 lbs. per acre...	17	1,985	599	45
⅓ " " " " 250 " ..	15	30	500	30
⅓ " " alone, 20 tons per acre.....	12	1,605	426	45
Giant Yellow Globe.				
(Pulled October 18.)				
⅓ acre—Manure and Bowker's 'Square' brand fertilizer, 500 lbs. per acre...	14	530	475	30
⅓ " " " " 250 " ..	12	1,395	423	15
⅓ " " alone, 20 tons per acre.....	11	1,775	396	15
Giant Yellow Globe and Mammoth Long Red.				
(Seed mixed before planting.)				
⅓ acre—Manure and Bowker's 'Square' brand fertilizer, 500 lbs. per acre...	11	965	382	45
⅓ " " " " 250 " ..	12	855	414	15
⅓ " " alone, 20 tons per acre.....	10	625	343	45

EXPERIMENTS WITH SUGAR BEETS.

Eight varieties of sugar beets were tested. These were on plots adjoining the mangel plots and received the same treatment in every particular. The dry weather prevailing during the early part of the season also prevented this crop from making good growth. The seed was sown May 30, and duplicate plots were sown June 13. The plots were each two rows, 66 feet long. The crop was harvested October 12. The following table gives the yield per acre obtained.

SUGAR BEETS—TEST OF VARIETIES.

No.	Name of Variety.	Yield per Acre. 1st Plot Sown.		Yield per Acre. 1st Plot Sown.		Yield per Acre. 2nd Plot Sown.		Yield per Acre. 2nd Plot Sown.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Red Top Sugar	26	140	869	..	27	1,440	924	..
2	Royal Giant	24	1,830	830	30	20	425	673	45
3	Improved Imperial	23	355	772	35	21	75	701	15
4	Wanzleben	22	880	748	..	18	1,455	624	15
5	Danish Improved	20	1,910	698	30	19	775	646	15
6	Danish Red Top	20	95	668	15	20	755	679	15
7	Vilmorin's Improved	18	795	613	15	16	1,330	555	30
8	French Very Rich	14	1,205	486	45	12	1,575	426	15

EXPERIMENTS WITH CARROTS.

Ten varieties of carrots were under test. They were grown in plots adjoining the turnip plots and received the same treatment in every particular. The seed was sown May 30, and duplicate plots were sown two weeks later, June 13. Each plot was two rows 66 feet long. The carrots also failed to make good growth owing to the dry weather prevailing during the first part of the summer. The crop was harvested October 25, and the following yields were obtained.

CARROTS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre. 1st Plot Sown.		Yield per Acre. 2nd Plot Sown.		Yield per Acre. 1st Plot Sown.		Yield per Acre. 2nd Plot Sown.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Mammoth White Intermediate	21	1,890	731	30	18	1,620	627	..
2	Carter's Orange Giant	20	1,910	698	30	19	1,105	651	45
3	White Belgian	20	260	671	..	18	1,445	624	5
4	Long Yellow Stump-rooted	19	1,765	662	45	18	1,950	632	30
5	New White Intermediate	18	1,290	621	30	17	1,145	585	45
6	Giant White Vosges	18	930	616	..	16	340	539	..
7	Ontario Champion	18	630	610	30	18	960	616	..
8	Half Long Chantenay	18	465	607	45	17	1,970	599	30
9	Early Gem	17	1,475	591	15	16	1,330	555	30
10	Improved Short White	16	1,660	561	..	14	710	478	30

EXPERIMENTS WITH POTATOES.

The land on which the potatoes were grown was a clay loam. The previous crop was clover. The ground was manured early in the fall with stable manure at the

rate of 20 one-horse cart loads per acre and at once ploughed under. In the spring this was gone over with the spade and springtooth harrow and ploughed. It was again worked once each with the spade, springtooth and smoothing harrows. Rows were run 30 inches apart and about 4 inches deep and potato fertilizer at the rate of 400 lbs. per acre scattered along the rows before planting. The sets were dropped one foot apart in these rows and covered with the plough. The tubers were cut so as to have from 2 to 3 eyes in each set. The drills were harrowed down once before the plants were above the ground and again drilled up in a few days and the soil kept loose with the cultivator until the vines were quite large. The field was hoed once by hand. The plots were sprayed with Bordeaux mixture and Paris green on July 20, August 5 and August 26. There was no blight noticeable on these plots and the tubers were free from rot. Forty-five varieties were included in the test. They were planted May 31 and dug September 1 and 3. Each plot was two rows, each 66 feet long. They yielded as follows :—

POTATOES—TEST OF VARIETIES.

Number.	Name of Variety.	Quality.	Total Yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour.
			Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Vick's Extra Early	Good	495	..	429	..	66	..	Long, round, white.
2	Carman No. 1	"	462	..	374	..	88	..	Flat, round, white.
3	Irish Cobbler	"	439	..	356	24	83	36	Round, white.
4	Pearce	"	424	36	358	36	66	..	Long, pink and white.
5	Green Mountain	"	418	..	319	..	99	..	Flat, round, white.
6	Country Gentleman	"	418	..	316	48	101	12	Long, pink and white.
7	Delaware	"	413	36	323	24	90	12	Flat, round, white.
8	Rochester Rose	"	409	12	352	..	57	12	Oblong, pink.
9	Rose No. 9	Medium	400	24	330	..	70	24	"
10	State of Maine	Good	398	12	316	48	81	24	Round, white.
11	Everett	"	396	..	297	..	99	..	Flat, round, white.
12	General Gordon	"	396	..	308	..	88	..	Oblong, pink.
13	Early St. George	"	391	36	275	..	116	36	"
14	Clay Rose	Medium	385	..	323	24	61	36	Round, pink.
15	I. X. L	Good	385	..	259	36	125	24	Long, pink and white.
16	Pingree	"	374	..	332	12	41	48	Oblong, white.
17	Early Norther	"	374	..	290	24	83	36	Long, pink and white.
18	Prolific Rose	"	369	36	275	..	94	36	Oblong, pink.
19	Maule's Thoroughbred	"	367	24	308	..	59	24	Long, pink.
20	Uncle Sam	"	363	..	281	36	81	24	Round, white.
21	Empire State	"	363	..	286	..	77	..	Long, white.
22	Dreer's Standard	"	356	24	264	..	92	24	Round, white.
23	Bovee	"	354	12	255	12	99	..	Oblong, pink and white.
24	Early Envoy	"	352	..	264	..	88	..	Long, pink.
25	Enormous	"	352	..	279	24	72	36	Round, white.
26	Penn Manor	"	352	..	259	36	92	24	Long, dark pink.
27	Burnaby Seedling	"	345	24	257	24	88	..	Long, pink and white.
28	Seedling No. 7	Medium	343	12	281	36	61	36	Oblong, pink.
29	Early Sunrise	Good	341	..	264	..	77	..	Long, round, pink.
30	Early White Prize	"	341	..	255	12	85	48	Long, white.
31	Early Michigan	"	341	..	231	..	110	..	Oblong, white.
32	Rawdon Rose	"	336	36	244	12	92	24	Round, pink and white.
33	Cambridge Russet	"	334	24	253	..	81	24	Oblong, white.
34	Canadian Beauty	"	332	12	257	24	74	48	Long, pink and white.
35	Money Maker	"	331	..	237	36	92	24	Long, white.
36	Late Puritan	"	323	24	233	12	90	12	Long, pink and white.
37	Early Andes	"	321	12	248	36	72	36	Round, pink.
38	American Giant	Medium	319	..	224	24	94	36	Long, pink.
39	Swiss Snowflake	Good	314	36	176	..	138	36	Oblong, white.
40	Reeves' Rose	"	312	24	246	24	66	..	Long, pink.
41	Sabean's Elephant	"	308	..	228	48	79	12	Long, white.
42	Early Rose	"	299	12	228	48	70	24	Long, pink.
43	Holborn Abundance	Medium	297	..	171	36	125	24	Oblong, white.
44	American Wonder	Good	253	..	198	..	55	..	Long, white.
45	Carman No. 3	"	242	..	213	24	28	36	Flat, round, white.

EXPERIMENTS TO TEST THE VALUE OF BUG DEATH AS COMPARED WITH PARIS GREEN AND BORDEAUX AND PARIS GREEN ON POTATOES.

Experiments were again conducted to test the comparative value of Bug Death, Paris green and Bordeaux Mixture and Paris green. The plots were alike in treatment of soil, date of planting, &c. The variety, Carman No. 1, was used. The soil was similar on all these plots and was treated in the same way. The plots were each 1-33 of an acre.

On one plot two applications of Bug Death were given, one on July 20 and one August 5. Four pounds of Bug Death was dusted on the plants at each application. The vines were quite large and this amount just nicely covered the leaves. It was applied in the early morning when the dew was on. Bugs were just commencing to feed at the time of the first application, and very few were noticed at the time of second application.

Paris Green and water at the rate of 1 oz. to 10 gallons of water, and one quart of lime water added, was applied by means of a spray pump to one plot, July 20 and August 5. At the time of the second application, about as many bugs were present on this plot as on the plot where Bug Death was used.

Poisoned Bordeaux Mixture, made of 4 lbs. bluestone, 4 lbs. lime, 4 ounces of Paris green and 40 gallons of water, was sprayed on a third plot July 20, August 4 and August 26. As many bugs were noticed at the time of the second application as were on the other two plots. No bugs were present at the time of the third application.

The Bug Death was quite as effective in killing the bugs as either the Paris green or poisoned Bordeaux. No blight was noticeable on any of these plots. The following yields per acre have been calculated from the weight of tubers taken from each of these plots of 1-33 of an acre:—

How treated.	Yield per acre. Bush.	Lbs.
Bordeaux and Paris green	356	24
Bug Death	340	16
Paris green	319	..

MATERIALS USED AND COST PER ACRE.

Bug Death Plot.

1st application, 132 lbs. per acre, at 7c. per lb.	$ 9 24
2nd application, 132 lbs. per acre, at 7c. per lb.	9 24
	$18 48

Paris Green Plot.

4 lbs. Paris green at 25 cts. per lb.	$ 1 00

Bordeaux and Paris Green Plot.

50 lbs. bluestone at 8 cts. per lb.	$ 4 00
50 lbs. rock lime at 1 ct. per lb.	50
4 lbs. Paris green at 25 cts. per lb.	1 00
	$5 50

EXPERIMENTS WITH SOJA BEANS AND HORSE BEANS.

Experiments were again conducted with Soja beans and Horse beans to test their relative value as forage crops, and also the yield per acre when grown in rows at different distances apart. The plots were 1-10 acre each. The soil was a clay loam in a good state of fertility. The seed was sown June 13. Many of the plants of both these plots were destroyed by the cutworms. The 'Black Dolphin' aphis destroyed the remaining plants of Horse Beans, and a frost September 1 killed the Soja Beans, making it impossible to obtain any reliable data from either of these plots.

EXPERIMENTS WITH ALFALFA.

A one-fortieth acre plot of Alfalfa was sown early in June, 1902, with barley as a nurse-crop. The nurse-crop was cut early in August. The plants only made fair growth and during the following winter were all killed out except a few plants. These made very poor growth during the season of 1903, and now only two weak plants remain.

In 1903 a similar plot was sown early in June. Wheat being used as a nurse-crop, was left uncut and allowed to remain as a protection to the plants during winter. The Alfalfa plants made a good start and nearly all came through the winter, but were in a sickly condition and made very poor growth this season. A few odd plants of Red clover that happened by chance to get into this plot lived through the winter and made exceptionally good growth. This plot was cut twice through the summer, at which times the Alfalfa was only from 4 to 6 inches high, while the few plants of Red clover in this plot were at least three times their height and weight. The soil of these two plots was a heavy clay, underdrained, in a fair state of fertility and well cultivated before sowing.

This season a plot of 1-10 acre of Alfalfa was sown. The soil was a heavy clay, underdrained, and in a good state of fertility. This land was plowed May 13 and well worked up. It was again worked May 29, June 20 and 29 with the springtooth and smoothing harrows. On July 7 this ground was again worked with the spade, springtooth and smoothing harrows and Alfalfa sown at the rate of 25 lbs. per acre with the grain seed drill. One-half of the plot was sown with wheat at the rate of 2 bushels per acre as a nurse-crop, and the other half with Alfalfa alone. The Alfalfa on the plot without a nurse-crop made a much more satisfactory growth than that with the nurse-crop, and was much better than that of any former year. On October 20 the growth of that sown alone averaged 10 to 12 inches, and that with the nurse-crop averaged only 5 to 7 inches. The nurse-crop, which made a growth of about 24 inches, was allowed to remain as a protection during winter.

MILLET.

Six varieties of millet were grown on land that was in grain last year. The ground was manured last fall at the rate of 15 one-horse cart loads per acre and ploughed under this spring. This ground was again ploughed and worked up with the disc, springtooth and smoothing harrows. The seed was sown June 15 with the Planet Jr. hand drill in plots of one-fortieth acre each. The crop was cut August 29, while still in a green state for feed. The yield per acre is for green feed when cut.

	Tons.	Lbs.
Moha Green California	14	750
Italian or Indian	10	350
Pearl or Cat Tail	7	
White Round French	5	1,750
Algerian	5	1,050
Moha Hungarian	5	250

CLOVER EXPERIMENTS.

Experiments were again conducted this season for the purpose of determining the gain, if any, from growing clover with grain crops for the purpose of turning under the growth made during the season for the benefit of future crops. The ground was the same as that on which similar clover experiments were conducted last season. The soil was a clay loam in a fair state of fertility. Three kinds of grain were sown and each of these series of plots were treated the same. Six plots were seeded down at the time the grain was sown, May 31, with Mammoth Red clover at the rate of 10 pounds per acre, and six with grain alone without clover. These plots were sown in a similar manner last season, and those seeded to clover this year had been seeded to clover last year, and those not seeded to clover this season had not been seeded to clover last year. The ground was ploughed in the fall and this spring was worked up with the disc, springtooth and smoothing harrows and the seed sown with the seed drill. The growth of clover on these plots was very light in 1903, consequently no very great difference in the yield per acre of grain from them this year could be expected. The clover on the plots seeded to clover was again unusually light and although starting well was killed out badly by the continued dry weather during June and July. Late sown grain rusted badly; especially was this the case with late sown wheat. The White Fife series of plots were so badly rusted that the crop was not worth threshing for the grain alone. The wheat was cut August 30; the oats, August 31; and the barley, August 27. The plots were one-fortieth acre each and gave the following yields per acre.

EXPERIMENTS WITH CLOVER SOWN WITH GRAIN.

Name of Variety of grain and how seeded.	Yield per Acre.	
White Fife Wheat.	Bush.	Lbs.
No. 1—Without clover	6	40
" 2—With clover	6	50
" 3—Without clover	6	20
" 4—With clover	5	10
Waverley Oats.		
No. 1—Without clover	54	24
" 2—With clover	62	32
" 3—Without clover	57	2
" 4—With clover	60	20
Odessa Barley.		
No. 1—Without clover	20	20
" 2—With clover	23	26
" 3—Without clover	27	4
" 4—With clover	27	24

SPECIAL EXPERIMENTS WITH FERTILIZERS.

Special experiments with fertilizers of various kinds commonly used for field crops have been conducted for the past five years. It was decided that the further fertilizing of these plots should be abandoned and the land seeded to grain for some years, to determine the extent to which these fertilizers already applied would continue to supply the crop with the required plant food. Accordingly the field was seeded entirely to grain. Mammoth Red clover was sown on one-half of the field at the rate of 10 pounds per acre at the same time. The other half was not seeded to clover.

The plots were one-eighth acre each on which fertilizers of different kinds had been previously applied. These plots were divided into ten strips 14 feet wide, each running lengthwise across all the different fertilized plots. These strips were sown with five different kinds of grain: namely, oats, wheat, barley, pease and mixed grain. A margin of two feet was left between each plot, and one foot between each crop plot. The yield from these plots is given in the following table:

Fertilizers used each Year during the past Five Years, per Acre.	Tartar King Oats with Clover.		Tartar King Oats without Clover.		Colorado Wheat with Clover.		Colorado Wheat without Clover.		Standwell Barley with Clover.		Standwell Barley without Clover.		Mixed Grain with Clover.		Mixed Grain without Clover.		Pease, Golden Vine, with Clover.		Pease, Golden Vine, without Clover.	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
1 Manure, 30 tons	67	22	85	10	16	40	22	30	50	..	56	12	57	20	60	..	29	10	30	..
2 Manure, 15 tons, fertilizer, 250 lbs	72	2	73	18	20	..	19	10	52	4	51	2	61	10	65	..	30	50	35	..
3 Complete fertilizer, 1,000 lbs.	44	4	47	2	15	..	15	50	35	20	27	4	41	10	40	..	24	10	28	20
4 " 500 lbs.	45	20	41	6	12	30	14	10	33	16	24	18	37	20	45	..	21	40	20	..
5 Check. No fertilizer used.	36	26	38	8	10	..	10	50	22	44	27	4	42	20	42	20	15	..	13	20
6 Bone-meal, 1,000 lbs.	52	32	48	18	11	40	11	40	33	16	29	8	43	30	41	10	25	..	22	30
7 " 500 lbs.	41	6	52	32	10	50	11	40	31	12	37	24	37	20	45	..	30	..	26	40
8 Ashes, 2,500 lbs.	47	2	55	30	11	40	12	5	43	36	46	42	35	..	47	20	28	20	27	30
9 Manure, rotted, 20 tons	66	6	73	18	15	50	17	30	54	8	50	..	56	10	65	..	29	10	31	40
10 Check. No fertilizer used.	33	28	29	14	6	40	7	30	20	40	22	44	30	.	27	20	16	40	11	40
11 Land plaster, 500 lbs	28	8	32	12	8	20	10	..	19	38	18	36	35	..	32	20	15	50	14	10
12 Salt, 500 lbs	42	22	39	24	10	50	13	20	25	..	30	10	41	10	35	..	25	..	23	20
13 Marsh mud, 100 tons	55	30	54	14	18	20	15	50	36	22	37	24	57	20	55	..	31	40	26	40
14 Manure, green, 20 tons	88	8	82	12	20	50	18	20	60	20	58	16	67	20	63	30	35	50	32	30

EXPERIMENTS WITH FERTILIZERS ON WHEAT.

Experiments were conducted this year with wheat fertilized with different fertilizing materials. The variety Australian No. 19 was used. The seed was sown at the rate of $1\frac{3}{4}$ bushels per acre, June 1, and was harvested September 3. The ground on which this wheat was grown is a clay loam, and was previously in roots, having been manured with 30 one-horse cart loads of stable manure for that crop. The land was ploughed this spring and subsequently worked into good tilth. The growth of straw averaged 40 inches. This crop was practically ruined by rust.

HAY.

The crop of clover and timothy hay was light, being fully one-third less than an average crop. Six acres of upland yielded 13 tons 1,165 lbs., and a 11-acre field yielded 24 tons 1,710 lbs. One acre of Awnless Brome yielded 1 ton 1,250 lbs. The 12 acres of underdrained marsh produced 15 tons 700 lbs., and the 35 acres not underdrained yielded 37 tons 1,270 lbs. This made a total of 93 tons 95 lbs.

SUMMARY OF CROPS GROWN ON THE EXPERIMENTAL FARM THIS SEASON.

Grain Field Crops.	Bush.	Lbs.
Oats	181	18
Barley	27	26
Mixed grain	412	23
Buckwheat	64	..
	685	27

Field of Turnips, Experimental Farm, Nappan.

Grain from Trial Plots.	Bush.	Lbs.
Oats	92	11
Barley	52	45
Wheat	25	2
Pease	27	44
	198	22

Roots, &c., Field Crops.	Bush.	Lbs.
Turnips	5,540	2
Mangels	1,767	55
	7,307	57

From Trial Plots.	Bush.	Lbs.
Turnips	277	34
Mangels	157	26
Carrots	74	12
Sugar Beets	66	16
Potatoes—marketable	116	15
Potatoes—not marketable	26	55
	718	38

Corn for Ensilage.	Tons.	Lbs.
Field crop	36	440
From trial plots	12	1,342
	48	1,782

SUMMARY OF FEED USED.

Summary of feeds used in connection with stock on farm, July 1, 1903, to June 30, 1904 :—

—	Hay.	Grain or Meal.	Corn or Roots.
	Lbs.	Lbs.	Lbs.
Grown on farm	205,272	52,686	640,560
Purchased	51,606	153,200	
Received by exchange	5,600	18,500	
Total	262,478	224,386	

The meal consumed consisted of oats, 37,094 lbs.; bran, 39,200 lbs.; middlings, 40,400 lbs.; mixed grain (oats, pease and barley), 34,104 lbs.; gluten meal, 30,000 lbs.; pea meal, 9,000 lbs.; oil cake, 8,500 lbs.; corn meal, 6,400 lbs.; moulie, 7,000 lbs.; wheat chop, 4,000 lbs.; buckwheat, 5,976 lbs.; barley, 2,712 lbs. Total, 224,386 lbs.

DISPOSITION OF FEEDS.

Disposition of feed harvested, and purchased for use of live stock on farm, July 1, 1903, to June 30, 1904:—

Class fed.	Grain or Meal.	Corn or Roots.	Hay.	Grain or Meal.	Corn or Roots.	Hay.
	Lbs.	Lbs.	Lbs.			Weighed at intervals and amount calculated from said weighings.
8 horses	41,200		58,400	Weighed	Weighed	
27 steers	27,210	244,350	59,292	"	"	
10 young steers	4,350	66,750	10,780	"	"	
21 cows (winter)	39,690	159,500	56,700	"	"	
27 cows (summer)	20,250		10,125	Estimated		
22 young stock	20,500	113,400	40,500	"	"	
Calves under 1 year	1,500			Weighed		
3 bulls	4,000		6,000	"		
Poultry	2,000			Estimated		
18 sheep	3,240	2,000	6,480	Weighed	"	
70 swine	38,000			"		
Seed	5,000			"		
On hand July 1	7,600			"		
Total account	213,940	556,000	248,277			
Amount harvested	224,386	640,560	262,478			
Shrinkage	10,446	84,560	14,201			
Shrinkage	4·65%	13·20%	5·41%			

GRAIN AND POTATO DISTRIBUTION.

Some of the most promising varieties of grain and potatoes were again distributed this year free to farmers who made application. The following number of packages of 3 lbs. each were sent out:—

Oats	198
Barley	65
Wheat	72
Pease	51
Buckwheat	25
Potatoes	331
Total	742

HORSES.

The stock of horses at present on the farm consists of three teams of heavy working horses, one express horse and one driver. There have been no changes during the year. All are in good condition.

CATTLE.

The herd of dairy cattle on the farm at present, of all ages and breeds, numbers 49 head as follows:—

1 Guernsey bull, 6 years old.
1 Ayrshire bull, 1½ years old.
1 Ayrshire bull calf.
2 Guernsey cows.
6 Ayrshire cows.
3 Holstein cows.
14 Grade cows.
1 Guernsey heifer, 1 year old.
5 Ayrshire heifers, 1 to 2 years old.
1 Holstein heifer, 1 year old.
7 Grade Ayrshire heifers, 1½ years old.
1 Ayrshire heifer calf.
2 Holstein heifer calves.
4 Grade heifers, Ayr. and Guernseys.

The steers on hand and in experiments number 34 head, as follows:—

8 three-year-old steers, short-horn grades.
8 two-year-old steers, short-horn grades.
8 one-year-old steers, short-horn grades.
10 steer calves, short-horn grades.

EXPERIMENT WITH DAIRY COWS.

This experiment was carried on as in former years, to further determine the profit or loss of a fairly good dairy herd, well fed and cared for, with the feeds consumed charged at current market prices, and receiving credit for milk produced, the value of which being established by the price received at the creamery during the season.

The different feeds were charged at the following prices: Wheat bran, $20 per ton; oats, $24 per ton; oil cake, $34 per ton; gluten-meal, $28.50 per ton; making an average price of mixed meal ration, as per proportion fed to cows, of 1½c. per pound. Roots at $2 per ton, ensilage at $2 per ton, and hay at $8 per ton.

The ration fed to cows in full milk was: Ensilage or roots, 50 lbs.; meal, 9 lbs.; hay, 10 lbs.; making a cost of 19½ cents per cow per day.

In summer months, while milking, they were charged $2.50 per month, and when dry, $1 per month.

When dry in winter they were charged $3 per month. Different quantities were fed to different cows, according to their capacity to consume and produce, or period of lactation, and charged accordingly.

They were kept in the stable from November 1, 1903, to June 1, 1904, except on occasional fine days, when they were allowed out in the yard.

From June 1 to November 1, they were put out in the field the greater part of the time, night and day, but kept in during cold or wet weather.

They were fed, watered and milked each day at as nearly regular intervals as possible, and by the same persons.

The summer feed was practically all summer soiling crops, rye, clover, or oats, pease and vetches grown together and sown at different times after July 15. They were fed some hay, and after August 15, green corn.

The milk of each cow was weighed at milking twice each day, and a careful record kept of the number of pounds given.

The percentage of fat in the milk of each cow was determined by the Babcock milk tester, and the fat credited to the cow; on the basis that 85 pounds of fat produces 100 pounds of marketable butter.

The milk was sent to the Nappan dairy station, and the cows were credited with the butter produced at the prices paid to all patrons of that station, which averaged for the winter months 24 4-7 cents per pound, and for the summer months 20⅔ cents per pound, less 4 cents per pound for manufacturing and hauling milk, leaving 20 4-7 cents per pound for winter butter and 16⅔ cents per pound for summer butter.

The skim-milk was fed to calves and pigs, and credited to the cows at the rate of 15 cents per 100 pounds.

Of the 27 cows on hand December 1, 1903, only 21 are reported as in milk. Of the remainder, one died, some failed to breed and others were old and disposed of.

The following table will show the results obtained during the year:—

RECORD OF DAIRY COWS.

Name.	Age.	Breed.	Date of dropping last Calf.	Days in Milk.	Quantity of Milk.	Fat.	Butter.	Value of Skim-milk.	Total Credit.	Cost of Feed.	Cost of Making Butter at 4c. per lb.	Total Cost	Profit.
	Yrs.				Lbs.	p. c.	Lbs.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Corie	7	Ayrshire Grade	Jan. 10, 1904	290	7,070	3·7	307·75	7 07	77 85	47 22	12 31	59 53	18 32
Ilda Rooker	5	Holstein	" 16, 1904	300	7,300	3·4	292·00	7 30	74 46	48 20	11 68	59 88	14 58
Yellow Kate	4	Ayrshire	Feb. 1	280	6,700	3·6	283·76	6 70	71 96	46 24	11 35	57 59	14 37
Rex's Maud	9	Guernsey	Jan. 20, 1904	280	5,260	4·5	278·47	5 26	69 30	46 24	11 15	57 37	11 93
Aitow	9	Ayrshire Grade	" 1, 1904	300	6,120	3·9	280·80	6 12	70 70	48 20	11 23	59 43	11 27
Carrie	11	"	Mar. 1, 1904	270	6,050	3·7	263·35	6 05	66 62	45 26	10 53	55 79	10 83
Curly	5	Ayrshire Gn. Grade	Feb. 1, 1904	300	6,010	3·9	275·75	6 01	69 43	48 20	11 03	59 23	10 20
Sonsy	8	Ayrshire	" 10, 1904	290	6,300	3·6	266·82	6 30	67 66	47 22	10 67	57 89	9 77
Rae	3½	Ayrshire Gn. Grade	Jan. 1, 1904	300	5,640	4·0	265·41	5 64	66 68	46 40	10 61	57 01	9 67
Lida Rooker	4	Holstein	" 1, 1904	300	6,590	3·3	255·84	6 59	65 43	48 20	10 23	58 43	7 00
Daisy	9	Ayrshire Grade	Mar. 1, 1904	270	5,430	3·6	229·88	5 43	58 30	45 93	9 19	53 12	5 18
Lizzie	3½	Ayrshire G. Grade	Dec. 15, 1903	310	5,210	3·8	232·91	5 21	58 77	45 26	9 31	54 57	4 20
Jessie P	10	Ayrshire Grade	May 15, 1904	285	5,300	3·8	236·94	5 30	59 79	46 73	9 47	56 20	3 59
Bluebell	3½	"	Dec. 30, 1903	210	4,700	3·7	204·58	4 70	51 75	41 90	8 18	50 08	1 67
Sarah	3½	Ayrshire	Feb. 15, 1904	255	4,740	3·7	206·35	4 74	52 20	42 53	8 25	50 78	1 42
Norah	2½	"	Jan. 1, 1904	270	4,760	3·8	212·80	4 76	53 70	43 82	8 51	52 33	1 38
Beatrice	5	"	Sept. 1, 1903	210	4,880	3·7	212·42	4 88	53 73	41 48	8 49	52 97	0 76
Molly	11	Sh. Ayrshire Grade	Feb. 6, 1904	295	4,950	3·8	221·29	4 95	55 84	47 21	8 85	56 06	*0 22
Maggie	2½	Ayrshire Grade	Jan. 1, 1904	240	4,510	3·8	201·62	4 51	50 87	43 40	8 06	51 46	0 59
Winnie	3½	Ayrshire Gn. Grade	" 1, 1904	300	4,540	3·9	208·30	4 54	52 44	45 40	8 32	53 72	1 28
Betsy	3½	Ayrshire Grade	" 10, 1904	260	4,680	3·6	198·21	4 68	50 26	44 04	7 92	51 96	1 70

*Loss.

EXPERIMENTS WITH STEERS.

TIED IN STALLS VS. FED IN LOOSE BOX.

This experiment was again carried on with the view of testing the advisability of feeding in loose boxes, as contrasted with similar steers fed tied in stalls.

Sixteen three-year-old steers were used for this test in two lots of eight each, of as nearly as possible equal form, fatness and weight (short-horn grades).

All weights were taken after a fast of fourteen hours, that is, at 9 a.m., without feed.

All were dehorned previous to beginning of test, and by careful weighing, both before and after dehorning, it was found that an average loss of 25 pounds per steer was sustained, requiring from 10 days to two weeks to regain.

All lots were fed alike, as nearly as possible, from start to finish of test, and kept in the stable all the time, except on occasional fine days, when they were let out for a time, averaging not more than once a week. The feeds were charged at the following prices: Hay, $8 per ton; roots, $2 per ton; ensilage, $2 per ton; mixed meals averaged $24 per ton; as per proportion fed.

The result of this experiment again shows slightly more gain for those fed in loose box stalls, than for those tied up, with a decided advantage as to the labour required, while the amount of straw required for loose steers is at least 50 per cent more than for those tied up.

Following are the results obtained :—

RECORD of steers, fed from November 16, 1903, to April 30, 1904.

LOT I.—DEHORNED, FED IN LOOSE BOX.

Numbers.	Nov. 16.	Dec. 1.	Gain.	Dec. 31.	Gain.	Jan. 30.	Gain.	Mar. 1.	Gain.	Mar. 31.	Gain.	Apr. 30.	Gain.	Total Gain.
	Lbs.	Lbs.	Lbs	Lbs.	Lbs	Lbs.	Lbs	Lbs.	Lbs	Lbs.	Lbs	Lbs.	Lbs	Lbs.
9...	1,075	1,115	40	1,195	80	1,265	70	1,315	50	1,350	35	1,380	30	305
10...	1,230	1,260	30	1,320	60	1,370	50	1,410	40	1,440	30	1,450	10	220
11...	1,220	1,260	40	1,330	70	1,380	50	1,440	60	1,480	40	1,510	30	290
12...	1,140	1,180	40	1,240	60	1,300	60	1,350	50	1,390	40	1,410	20	270
13...	1,065	1,100	35	1,175	75	1,225	50	1,265	40	1,305	40	1,340	35	275
14...	1,340	1,390	50	1,470	80	1,530	60	1,590	60	1,640	50	1,675	35	335
15...	1,275	1,325	50	1,405	80	1,475	70	1,525	50	1,565	30	1,595	30	320
16...	1,090	1,040	40	1,130	90	1,190	60	1,240	50	1,280	40	1,310	30	310
	9,345	9,670	325	10,265	595	10,735	490	11,135	400	11,450	315	11,670	220	2,325

LOT II.—DEHORNED, TIED IN STALLS.

1...	1,415	1,465	50	1,545	80	1,605	60	1,645	40	1,695	50	1,725	30	310
2...	1,300	1,340	40	1,400	60	1,450	50	1,495	45	1,525	30	1,560	35	260
3...	1,225	1,275	50	1,345	70	1,385	40	1,425	40	1,460	35	1,485	25	260
4...	1,130	1,180	50	1,260	80	1,300	40	1,350	50	1,390	40	1,415	25	285
5...	1,065	1,100	35	1,160	60	1,195	35	1,245	50	1,285	40	1,310	25	245
6...	1,175	1,220	45	1,300	80	1,360	60	1,400	40	1,440	40	1,475	35	300
7...	1,080	1,120	40	1,170	50	1,220	50	1,260	40	1,290	30	1,310	10	230
8...	1,070	1,100	30	1,160	60	1,200	40	1,250	50	1,275	25	1,305	30	235
	9,460	9,800	340	10,340	540	10,715	375	11,070	355	11,360	290	11,585	225	2,125

EXPERIMENT WITH STEERS—*Continued.*

Ex. 1.—Average cost of 1 steer per day for entire period.

Period.	Daily Ration.	Daily Cost.	Cost for period.	Total.
1903.	Lbs.	$ cts.	$ cts.	$ cts.
Nov. 16 to Dec. 1	Roots 90	0 09	1 35	
	Hay. .. . 10	0 04	0 60	
	Meal. 2	0 02⅖	0 36	
				2 31
Dec. 1 to Dec. 31	Roots 60	0 06	1 80	
	Hay.. 10	0 04	1 20	
	Meal. 4	0 04⅘	1 44	
				4 44
1904.				
Dec. 31 to Jan 30	Roots ... 40	0 04	1 20	
	Hay..... 10	0 04	1 20	
	Meal. 5	0 07⅕	2 16	
				4 56
Jan. 30 to March 1	Roots 30	0 03	0 90	
	Hay..... 12	0 04⅘	1 44	
	Meal..... 7	0 08⅖	2 52	
				4 86
March 1 to March 31	Roots ... 30	0 03	0 90	
	Hay..... 15	0 06	1 80	
	Meal..... 8	0 09⅗	2 88	
				5 58
March 31 to April 30	Roots 20	0 02	0 60	
	Hay..... 15	0 06	1 80	
	Meal... . 8	0 09⅖	2 88	
				5 28
Cost of feed, 1 steer				27 03
" 16 steers				432 48

SUMMARY OF EXPERIMENT WITH STEERS.

Financial Part.

Original weight of 16 steers, 18,805 lbs., at 4⅛c. per lb.		$ 775 70
Weight at finish of 16 steers, 23,255 lbs., at 5 $\frac{40}{100}$ c. per lb.		1,255 77
Balance		480 07
Cost of feed for lot, 165 days		432 48
Net profit		47 59
Daily rate of gain per steer	Lbs.	1·68
Cost of 1 lb. gain	Cts.	9·71
Cost of feed per day per steer	"	16·38
Profit per steer		$2 97

It will be observed that an advance in price of 1·11 cents per lb. over buying price is required on a five months' feeding season, to cover feeding operations. The advance this season being 1·275 cents per lb, leaves a balance of $47.59 for lot. As in all other live stock experiments, no charge is made for labour, nor credit given for manure made.

STEER CALF EXPERIMENT.

This experiment which was started in May, 1901, with ten calves, in two lots of five each, to determine the comparative economy of feeding calves a 'full fattening ration' from the start, as contrasted with a 'limited growing ration,' was continued with the five termed Ex. I., Lot II., L.G.R. calves of May, 1901, Lot I. of Ex. I., having been considered finished and sold April 30, 1903. Ex. II. calves of May, 1902, Ex. III. calves of May, 1903, were also continued, while Ex. IV. ten calves of May, 1904, was commenced.

EXPERIMENT I.—LIMITED GROWING RATION. CALVES OF MAY, 1901, CONTINUED FROM DECEMBER 1, 1903.

Lot II.	Daily Ration.	Daily Cost.	Cost for Period.	Total.
Period.		$ cts.	$ cts.	$ cts.
December 1 to December 31	Roots, 90 lbs	0 09	2 70	
	Hay, 8 lbs	0 03½	0 96	
	Meal, 3 lbs	0 03⅗	1 08	
				4 74
December 31 to January 30	Roots, 90 lbs	0 09	2 70	
	Hay, 8 lbs	0 03½	0 96	
	Meal, 4 lbs	0 04⅘	1 44	
				5 10
January 30 to March 1	Roots, 60 lbs	0 06	1 80	
	Hay, 8 lbs	0 03½	0 96	
	Meal, 6 lbs	0 07⅕	2 16	
				4 92
March 1 to March 31	Roots, 40 lbs	0 04	1 20	
	Hay, 10 lbs	0 04	1 20	
	Meal, 8 lbs	0 09⅗	2 88	
				5 28
March 31 to April 30	Roots, 30 lbs	0 03	0 90	
	Hay, 10 lbs	0 04	1 20	
	Meal, 10 lbs	0 12	3 60	
				5 70
April 30 to May 30	Roots, 20 lbs	0 02	0 60	
	Hay, 12 lbs	0 04⅘	1 44	
	Meal, 10 lbs	0 12	3 60	
				5 64
Cost of feed, 1 steer				31 38
" 5 steers				156 90

Lot II.	Weight at Start.	Weight at Finish.	Gain.
Period.	Lbs.	Lbs.	Lbs.
December 1 to May 30	5,160	6,530	1,370

	Lbs.
Weight of five steers, December 1, 1903	5,160
Weight of five steers, May 30, 1904	6,530
Gain for period	1,370
Daily rate of gain per steer	1·52
Cost of feed per day per steer	$ 0 17·43
Cost of 1 lb. gain	0 11·45
Cost of feed for lot, 180 days	156 90
Cost of 1 lb. gain for entire experiment	0 06·15

EXPERIMENT I.—LOT I.—F.F.R. CALVES OF MAY, 1901.

Lot I. finished April 30, 1903, sold and reported page 289 Report of 1903. Inserted for comparison.

SUMMARY OF LOT I.—EXPERIMENT I.

	Lbs.
Weight of five steers, December 1, 1902	4,620
Weight of five steers, April 30, 1903	6,355
Gain for period	1,735
Daily rate of gain per steer	2·32
Cost of feed per day per steer	$ 0 12·54
Cost of 1 lb. gain	0 06·
Cost of feed for lot, 150 days	104 10
Cost of 1 lb. gain for entire experiment	0 05·53

STEER CALF EXPERIMENT—EXPERIMENT II.

Experiment II. (continued from December 1, 1903.)

The following tables show results to March 30, 1904, and December 1, 1904.

The full fattening ration 'Lot I.' of this experiment were finished and sold March 30, 1904. The limited growing ration Lot II. will be kept until spring of 1905.

EXPERIMENT II.—CALVES OF MAY, 1902. CONTINUED FROM DECEMBER 1, 1903.

Lot I.	Daily Ration.	Daily Cost.	Cost for Period.	Total.
Period.		$ cts.	$ cts.	$ cts.
Dec. 1 to Dec. 31	Roots, 60 lbs	0 06	1 80	
	Hay, 8 lbs	0 03⅓	0 96	
	Meal, 3 lbs	0 03⅔	1 08	
				3 84
Dec. 31 to Jan. 30	Roots, 60 lbs	0 06	1 80	
	Hay, 8 lbs	0 03⅓	0 96	
	Meal, 4 lbs	0 04⅘	1 44	
				4 20
Jan. 30 to Mar. 1	Roots, 40 lbs	0 04	1 20	
	Hay, 10 lbs	0 04	1 20	
	Meal, 5 lbs	0 06	1 80	
				4 20
Mar. 1 to Mar. 31	Roots, 30 lbs	0 03	0 90	
	Hay, 10 lbs	0 04	1 20	
	Meal, 6 lbs	0 07⅕	2 18	
				4 26
Cost of feed, 1 steer				16 50
" 5 steers				82 50

	Lbs.
Original weight, 5 steers, December 1, 1903	5,220
Weight at finish, 5 steers, March 30, 1904	6,230
Gain for period	1,010
Daily rate of gain per steer	lbs. 1·68
Cost of feed per day per steer	cts. 13·75
Cost of 1 lb. gain	" 8·16
Cost of feed for lot, 120 days	$ 82 50

EXPERIMENT II.—CALVES OF MAY, 1902, CONTINUED FROM DECEMBER, 1, 1903.

Lot II.	Daily Ration.	Daily Cost.	Cost for Period.	Total Cost.
Period.		$ cts.	$ cts.	$ cts.
Dec. 1 to Dec. 31	Roots, 40 lbs.	0 04	1 20	
	Hay, 4 lbs.	0 01½	0 48	
	Straw, 5 lbs.	0 01½	0 45	
				2 13
Dec. 31 to Jan. 30	Roots, 40 lbs.	0 04	1 20	
	Hay, 4 lbs.	0 01½	0 48	
	Straw, 5 lbs.	0 01½	0 45	
				2 13
Jan. 30 to March 1	Roots, 40 lbs.	0 04	1 20	
	Hay, 8 lbs.	0 03⅜	0 96	
				2 16
March 1 to March 31	Roots, 40 lbs.	0 04	1 20	
	Hay, 8 lbs.	0 03⅜	0 96	
				2 16
March 31 to April 30	Roots, 30 lbs.	0 03	0 90	
	Hay, 10	0 04	1 20	
				2 10
April 30 to May 30	Roots, 20 lbs.	0 02	0 60	
	Hay, 12	0 04⅘	1 44	
				2 04
May 30 to Nov. 1	5 months at pasture at			6 00
Nov. 1 to Dec. 1	Roots, 80 lbs.	0 08	2 40	
	Hay, 8 lbs.	0 03⅜	0 96	
	Meal, 3 lbs.	0 03⅗	1 08	
				4 44
Cost of feed for 1 steer, 365 days				23 16

STEER CALF EXPERIMENT II.—CONTINUED.

Lot II.	Weight at start.	Weight at finish.	Gain.
Period.	Lbs.	Lbs.	Lbs.
Dec. 1 to June 1	3,690	4,395	705
June 1 to Dec. 1	4,395	5,475	1,080

	Lbs.
Original weight of 5 steers, Dec. 1, 1903	3,690
Weight at finish, of 5 steers, Dec. 1, 1904	5,475
Gain for period	1,785
Daily rate of gain per steer	lbs. ·97
Cost of feed per day per steer (winter)	cts. 8·17
" " " (summer)	" 4·00
" " " for period	" 6·34
Cost of 1 lb. gain	" 6·48
Cost of feed for lot, 1 year	$115 80

EXPERIMENT III.—LOT I, FULL FATTENING RATION—CALVES OF MAY, 1903.

Period.	Daily Ration.	Daily Cost.	Cost for Period.	Total.
		$ cts.	$ cts.	$ cts.
Dec. 1 to Dec. 31	Roots, 15 lbs.	0 01½	0 45	
	Hay, 2½ lbs.	0 01	0 30	
	Meal, 2 lbs.	0 02⅖	0 72	
				1 47
Dec. 31 to Jan. 31	Roots, 20 lbs.	0 02	0 60	
	Hay, 2½ lbs.	0 01	0 30	
	Meal, 2 lbs.	0 02⅖	0 72	
				1 62
Jan. 31 to March 1.	Roots, 25 lbs.	0 02½	0 75	
	Hay, 4 lbs.	0 01⅗	0 48	
	Meal, 2 lbs.	0 02⅖	0 72	
				1 95
Mar. 1 to Mar. 31.	Roots, 30 lbs.	0 03	0 90	
	Hay, 4 lbs.	0 01⅗	0 48	
	Meal, 2 lbs.	0 02⅖	0 72	
				2 10
Mar. 31 to April 30.	Roots, 30 lbs.	0 03	0 90	
	Hay, 4 lbs.	0 01⅗	0 48	
	Meal, 2 lbs.	0 02⅖	0 72	
				2 10
April 30 to May 30.	Roots, 30 lbs.	0 03	0 90	
	Hay, 4 lbs.	0 01⅗	0 48	
	Meal, 2 lbs.	0 02⅖	0 72	
				2 10
May 30 to June 30	Roots, 30 lbs.	0 03	0 90	
	Hay, 5 lbs.	0 02	0 60	
	Meal, 2 lbs.	0 02⅖	0 72	
				2 22
June 30 to July 15	Meal, 2 lbs.	0 02⅖	1 08	
	Pasture at		1 50	
				2 58
July 15 to Oct. 1.	Green feed, 40 lbs.	0 04	3 00	
	Meal, 2 lbs.	0 02⅖	1 80	
				4 80
Oct. 1 to Nov. 1	Pasture at		1 00	
				1 00
Nov. 1 to Dec. 1	Roots, 40 lbs.	0 04	1 20	
	Hay, 5 lbs.	0 02	0 60	
	Meal, 2 lbs.	0 02⅖	0 72	
				2 52
Cost of feed 1 steer, 365 days				24 46

STEER CALF EXPERIMENT III.—CONTINUED.

Period.	Lot I.		
	Weight at Start.	Weight at Finish.	Gains.
	Lbs.	Lbs.	Lbs.
December 1 to June 1	2,895	3,710	815
June 1 to December 1	3,710	4,820	1,110

	Lbs.
Weight at start, 5 steers, Dec. 1, 1903	2,895
Weight at finish, 5 steers, Dec. 1, 1904	4,820
Gain for period	1,925

Daily rate of gain per steer	lbs.	1·05
Cost of feed per day per steer (winter)	cts.	6·60
Cost of feed per day per steer (summer)	"	6·83
Cost of 1 lb. gain	"	6·35
Cost of feed per day per steer for period	"	6·70
Cost of 1 lb. gain	"	6·35
Cost of feed for lot, 1 year		$122 30

Steer Calf Experiment IV.

In estimating the cost of feeding calves, the following values were put on the different feeds :—

New milk, $1 per 100 pounds.
Skim milk, 15 cents per 100 pounds.
Meal (oats, wheat, bran and oil cake), $1 per 100 lbs.
Roots or ensilage, 10 cents per 100 lbs.
Hay, $8 per ton.

Experiment IV.—Lot I. Full fattening ration—calves of May, 1904.

Period.	Daily Ration.	Amount fed during Period.	Cost.	Total Cost.
		Lbs.	$ cts.	$ cts.
June 1 to July 1	10 lbs. whole milk	1,500	15 00	
	10 lbs. skim-milk	1,500	2 25	
	¼ lb. meal	37½	0 37½	
				17 62½
July 1 to August 1	10 lbs. whole milk	1,550	15 50	
	10 lbs. skim-milk	1,550	2 32	
	½ lb. meal	77½	0 77½	
				18 59½
August 1 to September 1	20 lbs. skim-milk	3,100	4 65	
	2 lbs. hay	310	1 24	
	1 lb. meal	155	1 55	
				7 44
September 1 to October 1	10 lbs. skim-milk	1,500	2 25	
	2 lbs. hay	300	1 20	
	1 lb. meal	150	1 50	
				4 95
October 1 to November 1	10 lbs. roots	1,550	1 55	
	2 lbs. hay	310	1 24	
	1½ lbs. meal	232	2 32	
				5 11
November 1 to December 1	10 lbs. roots	1,500	1 50	
	2 lbs. hay	300	1 20	
	2 lbs. meal	300	3 00	
				5 70
Cost of feed, 5 calves 180 days				59 42

		Lbs.
Weight of 5 calves, June 1, 1904		905
Weight of 5 calves, Dec. 1, 1904		2,650
Gain for period		1,745

Daily rate of gain per steer ..... lbs.	1·90
Cost of 1 lb. of gain ..... cts.	3·40
Cost of feed per day ..... "	6·49
Cost of feed for lot, 183 days	$59 41

STEER CALF EXPERIMENT IV.—LOT II. LIMITED GROWING RATION CALVES OF MAY, 1904.

Period.	Daily Rations.	Amount fed during Period.	Cost.	Total Cost.
		Lbs.	$ cts.	$ cts.
June 1 to July 1	10 lbs. whole milk	1,500	15 00	
	10 lbs. skim-milk	1,500	2 25	
	¼ lb. meal	37½	0 37½	
				17 62½
July 1 to August 1	5 lbs. whole milk	775	7 75	
	15 lbs. skim-milk	2,325	3 49	
	¼ lb. meal	38¾	0 38¾	
				11 63¾
August 1 to September 1	20 lbs. skim-milk	3,100	4 65	
	2 lbs. hay	310	1 24	
	¼ lb. meal	38¾	0 38¾	
				6 27¾
September 1 to October 1	10 lbs. skim-milk	1,500	2 25	
	2 lbs. hay	300	1 20	
	½ lb. meal	75	0 75	
				4 20
October 1 to November 1	10 lbs. roots	1,550	1 55	
	2 lbs. hay	310	1 24	
	½ lb. meal	77½	0 77½	
				3 56½
November 1 to December 1	20 lbs. roots	3,000	3 00	
	2 lbs. hay	300	1 20	
	½ lb. meal	75	0 75	
				4 95
Cost of feed, 5 steers, 183 days				48 24

	Lbs.
Weight of 5 calves, June 1, 1904	650
Weight of 5 calves, Dec. 1, 1904	2,015
Gain for period	1,365
Daily rate of gain per calf ..... lbs.	1·51
Cost of 1 lb. gain ..... cts.	3·53
Cost of feed per day per calf ..... "	5·27
Cost of feed for period, 5 calves	$48 24

PIGS.

The herd of pigs on the farm consists of Yorkshires, Berkshires and their grades and crosses, in all 70 head, as follows :—

1 York-hire boar.
3 Yorkshire sows.
2 Berkshire sows.
4 Grade-York sows.
20 Grade pigs, 6 months old.
40 Grade pigs, 1 to 2 months old.

EXPERIMENTS WITH SWINE.

Feeding in pasture as compared with feeding in pens.

This experiment, carried on in the summers of 1902-03, was repeated this year with 20 pigs of one month old, in two lots of 10 each, of various breeds and crosses, each lot consisting of an equal number from each litter and termed lot I. and lot II.—lot I. in pasture and lot II. in pens.

Lot I. were fed an average daily ration of 2 lbs. meal, largely shorts, and 5 lbs. skim-milk, from July 1 to November 1, and pasture, which consisted of clover, rape, hairy or sand vetch, and spring vetch and peas mixed sown on different parts of a field of one acre in extent.

Lot II. were fed the same daily ration in pens.

A portable house was used for shelter.

On November 1 the pigs were taken into pens, and fed a ration of 3 lbs. meal until December 1.

The results are as follows :—

EXPERIMENTS WITH SWINE—EXPERIMENT I.

LOT I. FED ON PASTURE, JULY 1 TO NOVEMBER 1; FED IN PENS, NOVEMBER 1 TO DECEMBER 1.

Period.	Weight at Start.	Weight at Finish.	Gain.
	Lbs.	Lbs.	Lbs.
July 1 to November 1	170	1,129	959
November 1 to December 1	1,129	1,609	480
Total gain, 10 pigs, 153 days			1,439

	Lbs.
Average daily gain on pasture, July 1 to November 1	·78
Average daily gain in pens, Nov. 1 to Dec. 1	1·60
Cost per pound gain, entire period	3·55 cts.

LOT II. FED IN PENS, JULY 1 TO DECEMBER 1, 1904.

Period.	Weight at Start.	Weight at Finish.	Gain.
	Lbs.	Lbs.	Lbs.
July 1 to March 1	185	1,169	984
November 1 to December 1	1,169	1,472	303
Total gain, 10 pigs, 153 days			1,287

	Lbs.
Average daily gain in pens, July 1 to November 1	·80
Average daily gain in pens, Nov. 1 to Dec. 1	1·01
Cost per pound gain, entire period	3·94 cts.

SHEEP.

The flock of sheep at present consists of:—

1 pure bred Leicester ram.
3 " " ewes.
5 " Shropshire ewes.
4 grade ewes.
2 Shropshire ewe lambs.
3 Leicester ewe lambs.
1 Leicester ram lamb.
1 grade wether lamb.

POULTRY.

During the year, six breeds of poultry were kept: B. P. Rocks, W. Leghorns, Black Minorcas, W. Wyandottes, Buff Wyandottes and Silver Grey Dorkings.

The breeding pens were made up as follows:—

	Hens	Cocks.
B. Plymouth Rocks	14	1
Black Minorcas	5	1
White Leghorns	4	1
White Wyandottes	5	1
Buff Wyandottes	3	1
Silver Grey Dorkings	2	1

The season's chicks were all hatched by incubators, the incubators being filled five times, with very unsatisfactory results. Partly owing to infertile eggs and weak germs, numerous fully developed chicks died in the shell at pipping stage, and those hatched were not as strong and vigorous as in former years.

The hens were apparently in good condition. So far, we have been unable to locate the trouble satisfactorily.

The eggs laid by the different breeds were as follows.

	Eggs laid	Av. per hen
14 B. P. Rocks	686	49
5 Black Minorcas	200	40
4 White Leghorns	200	50
5 White Wyandottes	245	49
3 Buff Wyandottes	141	47
2 Silver Grey Dorkings	90	45

CORRESPONDENCE.

During the year, 2,030 letters were received, and 1,790 sent out, exclusive of circulars sent out with grain distribution, reports, &c.

EXHIBITIONS, AGRICULTURAL MEETINGS AND EXCURSIONS TO THE FARM.

An exhibit was made of farm produce at the Nova Scotia provincial exhibition, Halifax, N.S., September 7 to 14; the New Brunswick provincial exhibition, St. John, N.B., September 16 to 24, and at the Prince Edward Island provincial exhibition, Charlottetown, P.E.I., September 27 to 30.

I addressed agricultural meetings during the year at West River, Pictou County, N.S.; Truro, N.S.; Fredericton, N.B.; Woodstock, N.B.; Chatham, N.B.; Pugwash, N.S.; Windsor, N.S.; Barronsfield, N.S.; River Hebert, N.S.; Greenville, N.S.; Wallace Bridge, N.S.; Upper Stewiacke, N.S.; Middle Stewiacke, N.S.; Brookfield, N.S., and Antigonish, N.S. I also delivered a series of lectures to the students of the Sussex, N.B. Dairy School in March. I also attended the Dominion Live Stock Convention at Ottawa, and the Maritime provincial exhibitions.

As usual many visitors have been on the farm this year and there have been several farmers' excursions, the largest of which was that of the Pictou County Farmers' Association on July 13, when over 1,000 were present. Small excursions from surrounding districts were frequently made to the farm.

I have the honour to be, sir,
Your obedient servant,

R. ROBERTSON,
Superintendent.

REPORT OF THE HORTICULTURIST.

(W. S. Blair.)

Nappan, N.S., December 1, 1904.

To Dr. Wm. Saunders,
Director Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit herewith a report of some of the work done in the horticultural department of the Experimental Farm for the maritime provinces during the year 1904.

The winter of 1903-4 was a severe one, and the temperature was not so variable as usual. The fruit and ornamental trees and shrubs, however, came through the winter in excellent condition and did not suffer more from winter injury than usual.

The spring was later at the start than usual, but toward the last of May favourable warm weather forced along vegetation, and by the middle of June the season was as far advanced as it generally is at that date.

The mean average temperature for May was 4° warmer than the average for the past four years. June was warmer than the same month in 1903 by over 2°. July was also much warmer than usual, being about 5° in the mean average above the same month in 1903. The balance of the season averaged about the same as usual. The following table gives the mean average temperature for the months of May, June, July, August and September, as compared with the same months during the past four years :—

Month.	Mean Temperature at Nappan.					Rainfall.	
	1904.	1903.	1902.	1901.	1900.	1904.	1903.
	°	°	°	°	°	In.	In.
May	51·7	47·7	47·6	48·1	46·1	1·76	0·68
June	55·9	53·6	54·5	59·3	57·	1·74	2·29
July	67·0	62·7	61·7	65·2	64·5	2·15	2·07
August	61·5	59·3	63·4	65·3	62·1	3·51	2·40
September	53·6	57·5	57·5	58·4	53·4	4·52	3·63

The season was exceptionally favourable for plants that require a fair amount of heat, such as tomatoes, squash and beans, all of which ripened up better than usual. This summer again was too dry for most farm crops, and many of the garden crops suffered greatly; especially was this the case with annual flowering plants. Never before has the lawn appeared so burnt and dried up as it was this summer. Where fruit trees were kept in a good state of cultivation they suffered little for want of moisture; but, generally speaking, the fruit was smaller than it would probably have been had the moisture conditions been more favourable. This was especially apparent in uncultivated orchards.

There were two frosts in June; one on the 9th of 1°, and one on the 10th of 2°, which did considerable damage to tomatoes, squash and tender annuals that were not covered. Fortunately the most of these were covered, as indications favoured a frost at this time. The only frosts recorded in May were on the 1st, 2nd, 6th and 7th of 1°, 5°, 6° and 5°, respectively. The first fall frost, September 1, of 1°, was earlier this season than usual, but light, doing slight damage. One on the 23rd of 9°, and one on the 28th of 2°, killed all tender plants.

The apple crop here this year was larger than usual. The capacity of the trees for producing is gradually increasing. Some of the varieties produce small unsaleable apples, and some are varieties of inferior quality which are hard to dispose of when such sorts as Gravenstein and Bishop Pippin are on the market in quantity at low prices, as was the case this season. Consequently the revenue from this source is not as high as anticipated. Heavy winds during the latter part of August and early September shook off a considerable quantity of fruit.

Two trees of Gravenstein were lost from the disease known as collar rot. This is a rotting of the bark at the surface of the ground. These trees were in a vigorous state until last season, when they appeared to lack vigour, and although the affected portions were removed, and the wounds well washed with a copper sulphate solution, they died during the winter, which was no doubt partly due to the severe season. One Banks or Red Gravenstein also winter root-killed. This tree had not previously been in a very vigorous state, although the bark appeared healthy. This tree was planted where there was heavy clay near the surface, which was probably the cause of its unthrifty condition. Four trees were injured by sunscalding above the veneering used for protection in the orchard, and had to be removed. In the orchard, protected by a shelter belt of natural spruce, two trees were injured by mice girdling below the veneering, which was not set down close enough to the ground. Mice were very numerous in the protected orchard, which was no doubt largely due to strips of land between the trees being previously in clover. No mice were noticed in the other orchard, where the whole ground was more or less in cultivated crops. Numerous complaints were received from different parts of the provinces of the damage done by mice. A good protection for trees against their attack is strips of veneering (thin hardwood) about 2 feet long wrapped around the trunk of the tree and tied with binder twine or some such strong twine. This veneering can be kept from year to year and made to serve for a number of years. This is also valuable for protecting trees from sunscald.

There was very little apple spot on the fruit this year, and very few apple worms. The apple and plum aphis were more numerous than usual, and were controlled by a spray of whale oil soap and water; 1 lb. soap to 6 gallons of water.

The plum crop was small, which was doubtless largely due to the severe winter. The pear crop was a failure, only the Flemish Beauty producing fruit. The crop of cherries was also small, and, as usual, the birds took the most of the fruit. From our experience it would appear that we cannot grow the sweet cherries here successfully. The common cherry of the country, of Richmond type, found growing in every section of the country, seems adapted to a larger range of conditions than any others. Seedlings of these start up under old trees and if set out and cultivated have given better satisfaction than any of the newer varieties. In some more suitable locations this may not hold good; but, generally speaking from a maritime standpoint, this is the case.

The strawberry plantation was on a piece of heavy soil on which ice formed during the winter, and the crowns of the plants were injured. When the mulch was removed it was found that the majority of the plots were killed out completely. Of the remaining plants the crop was light owing to the dry weather. The crop of gooseberries was fair. The English varieties were badly covered with mildew, rendering them largely unmarketable. They were sprayed several times with potassium sulphide, 1 oz. to 2 galls. water, which only partially controlled this fungus. The currants were a fair crop. Raspberries a light crop.

The fruit and ornamental trees and shrubs have made a fair growth of wood during the season which seems to have ripened up well. The perennial flowering plants did well, and some additional Japanese Irises were planted. In this report a list of some of the best perennials tested during the past four years, is given. There is also given in this report the results of some experiments conducted to find out the moisture contents of soil treated in different ways. Tests, as usual, have been carried on with different varieties of vegetables, some of which are given herewith. Some experiments were also tried, conducted with materials recommended for the destruction of root maggots and cutworms. The results also of some experiments with cover crops grown in the orchard here are included.

I beg to acknowledge the following donations:—From Prof. Sears, Director School of Horticulture, Wolfville, N.S., scions of 'Red Russet' apple. From Mr. Whitman Ruggles, Nictaux, N.S., scions of 'Red Russet' apple. From Mr. A. C. Starr, Starr's Point, N.S., scions of 'Bosc' pear and 'Winterstein' apple. From Mr. Wm. Bustin, Belleisle, Granville, Annapolis Co., N.S., scions of 'Ribston Pippin' apple. From Mr. James Bonneyman, New Annan, N.S., scions of 'Rhymer Pippin apple. From Mr. John Robertson, 'Inkerman Farm,' New Perth, P.E.I., seedling apple stocks for root grafting. From Mr. Henry Piers, North-west Arm, N.S., seeds of 'Asparagus' pole beans. From D. J. Stewart, Lower Montague, P.E.I., plants of 'Cyclone,' 'Hunn' and 'Excelsior' strawberries.

I also addressed several agricultural meetings in each of the three maritime provinces during the year.

PERENNIALS.

Many different kinds of herbaceous perennials have been tested in the perennial border during the past four years. The following is a list of some of those which have done the best:—

Anemone narcissiflora.—Wind flower. Height 8 to 10 inches. Pretty white flowers, 1 to 1½ inches across. In bloom from the last of May to the last of July.

Arabis alpina.—White Alysssum. Height 6 inches. An abundance of small white flowers borne profusely over the whole plant. In bloom the 10th of May.

Aster Novæ Angliæ roseus.—Pink-flowered New England aster. Height 3 feet. In bloom the last of August. A showy perennial flowering profusely in clusters of bright pink.

Aconitum napellus.—Common monk's hood or helmet flower. Height 4½ feet. Comes into bloom soon after the middle of July. The flowers are blue, borne on large terminal spikes.

Aconitum napellus album.—Similar to the above, except that the flowers are nearly white. These two plants are very desirable for rear border planting.

Achillea ptarmica flore pleno.—Double sneezewort. Height 2 feet. Flowers small, white, round, compact, borne in loose clusters. In bloom from the middle of June to the last of August. One of the finest white flowering perennials for cutting.

Aquilegia chrysantha.—Golden spurred columbine. Height 2½ feet. Large, bright yellow flowers. In bloom the first of July.

Aquilegia oxysepala.—Russian columbine. Height 1 foot. In bloom the last of May. Flowers large purplish-blue. A very desirable early flowering perennial.

Boltonia latisquama.—Height 5 feet. White flowers, somewhat resembling the wild aster, borne profusely in large panicles. In bloom the middle of August. One of the best tall late flowering perennials.

Boltonia asteroides.—False chamomile. Height 4½ feet. Small pale pink flowers similar to the above. A profuse bloomer after the last of August. A showy late perennial that will stand wind without staking.

Campanula persicifolia.—Peach-leaved bellflower. Height 2 feet. Large blue flowers borne in a raceme with long flower stems. . In bloom during the month of July.

Campanula persicifolia grandiflora alba.—Double white bellflower. This is one of the best campanulas grown here. Large white double flowers. Height 2 feet. In bloom during July.

Clematis recta.—Erect Virgins Bower. Height 4 feet. In bloom during July. The flowers are white, small, borne profusely in dense clusters. Valuable for back of perennial border. Much admired.

Convallaria majalis.—Lily of the Valley. In bloom the first week in June. The plants do best in a shaded place. The bloom of this well known flower has in the past been injured greatly by our early June frosts.

Coreopsis delphinifolia.—Larkspur-leaved tick-seed. Height 2½ feet. Showy yellow flower with dark centre. In bloom July 20 to the last of August. One of the best perennials.

Delphinium cashmerianum.—Cashmerian larkspur. Height 18 inches. Flowers in different shades of blue; borne in large open heads. In bloom from the middle of July to the last of August.

Dicentra spectabilis.—Bleeding heart. Height 2½ feet. Red and white heart-shaped flowers, borne in pendulous racemes.

Doronicum plantagineum excelsum.—Tall plantain-like leopard's bane. Height 18 inches. In bloom the first of June. Large yellow flowers on long stems. Liked for cutting. One of the best.

Doronicum caucasicum.—Caucasian leopard's bane. Height 12 inches. Yellow flower similar to the above, but smaller. In bloom May 25 to June 18. These are two of the most desirable and showy spring flowering perennials.

Erigeron macranthus.—Fleabane. Height 18 inches. Flowers heliotrope, rays with yellow centres. In bloom during July. A much admired perennial.

Funkia sieboldiana.—Large-flowered plantain lily. Height 15 inches. Flowers pale blue, borne in racemes. In bloom July 18. This with its regular plantain-like leaves overlapping each other makes an interesting plant.

Gypsophila paniculata.—Infant's breath. Height 2½ feet. Small white flowers, borne profusely in large open panicles. In bloom from the last of July to September. Much liked for cutting.

Gaillardia aristata grandiflora.—Large flowered blanket flower. Height 18 inches. Flowers borne singly on long stems, yellow, with deep orange centres. In bloom during July and August. Very useful for cutting.

Helenium grandicephalum striatum.—Large striped Sneezewort. Height 3½ feet. Flowers yellow, with brown markings. A striking perennial in bloom from early August to October.

Helenium autumnale.—Autumn flowering Sneezewort. Height 4 feet. Large yellow flowers. Very showy. In bloom the last of July to the last of September.

Helianthus maximiliana.—Perennial sunflower. Height 4 feet. Flowers large yellow. Very showy. In bloom early in August.

Hemerocallis flava.—Yellow day lily. Height 2 feet. Flowers fragrant, orange yellow. In bloom after July 1. This is one of the best day lilies.

Iris pumila.—Dwarf Iris. Height 5 inches. In bloom the last of May. Flowers purple.

Iris Sibirica.—Siberian Iris. Height 3 feet. Flowers white and blue. Small, on long stems. In bloom the middle of June. Not so attractive as some other forms of Iris.

Iris Germanica.—German Iris. Height 2 feet. In bloom from the middle to the last of June. Flowers large, ranging in colours of lilac, blue and purple. Slightly fragrant. One of the most desirable groups of irises of which there are many good varieties. Purple King is an especially striking one.

Iris florentina.—Orris root. Height 2 feet. Flowers pale lilac blue, shading to white. Large flowers, sweet scented, on long stalks. A good one. In bloom from the middle to last of June.

Iris flavescens.—Height 2 feet. Flowers lemon yellow, with purplish brown markings. In bloom at the same time as the above.

Iris variegata.—Height 1½ to 2 feet. Flowers large, much veined with brown on a yellow ground. The variety Honorabile is a good one of this group.

Iris Amœna.—Height 18 inches. In bloom second and third week in June. Flowers almost white or lilac-tinted outer segments and purple or purple-tinted centre. This has a variety of markings. Mrs. H. Darwin, an almost pure white variety of this group, is also very fine.

Iris plicata.—Fringed Iris. Height 18 inches. Flowers white in centre of outer segments; veined with lilac toward the margin; inner segments white tinted with lilac or blue. Madame Chereau is a fine variety of this group.

Iris kaempferi.—Japanese Iris. Height 18 inches. In bloom soon after the middle of July. The flowers are very large, with various combinations of colours. A very desirable late flowering plant of which there are a great number of varieties.

Lilium auratum.—Golden-rayed lily of Japan. Height 3 feet. In bloom the second week in June. Flowers large, white petals, spotted with red and purple, and golden centre. Very desirable.

Lilium tennifolium.—Narrow-leaved Siberian lily. In bloom the first of July. Height 2 feet. Flowers bright scarlet drooping. A very attractive little lily.

Lilium tigrinum.—Common tiger lily. Height 2½ feet. Flowers deep orange, large petals, spotted with many purplish black dots. In bloom the first of July.

Lilium superbum.—Superb lily. Height 4½ feet. Flowers orange red spotted with dark brown. Very showy.

Lilium candidum.—Madonna lily. Flowers large, pure white, fragrant; one of the best for general cultivation. Height, 2 feet. In bloom early in July.

Lilium speciosum.—Showy Japanese lily. Height, 2½ feet. In bloom the middle of July. Flowers white, more or less tinged with pink and doted with red; a very fine lily, of which there are several varieties.

Paeonia officinalis, and *Paeonia sinensis.*—The common and Chinese paeonys are in bloom during the greater part of July. There are a great number of varieties, some of which should be included in every garden.

Papaver orientale.—Oriental poppy. Height 2 feet. In bloom the last of June. Flowers very large; a blaze of scarlet.

Papaver nudicaule.—Iceland poppy. Height 1 foot. In bloom the middle of May and continues through the summer. Flowers orange, white or yellow. Very desirable.

Phlox subulata lilacina.—Moss pink. A profuse bloomer from about May 24 to the middle of June. Low matted growth. Flowers light blue. Very desirable.

Phlox amoena.—Lovely Phlox. In bloom about the same time as the above. Flowers bright pink. Low matted growth of 4 to 6 inches. Very desirable.

Phlox decussata.—Hybrid perennial phlox. Height 1½ to 3 feet. In bloom during August and September. The many varieties of this beautiful plant show some superb markings in many shades and colours.

Rudbeckia laciniata.—Golden Glow. Height, 5 to 6 feet. Flowers large; bright yellow, double. This is a profuse bloomer during August, and is one of the most desirable tall-growing perennials.

Rudbeckia maxima.—Great cone flower. Height 5 to 6 feet. In bloom during August. Flowers yellow, with a long cone-shaped centre.

Pyrethrum uliginosium.—Great Ox-eye. Height 3½ feet. Flowers white with yellow centre. In bloom after the last of August.

Spiræa filipendula.—Dropwort. Height 2 feet. In bloom from the first to after the middle of July. A profuse bloomer; flowers white, borne in loose panicles.

Spiræa ulmaria.—Meadow sweet. Height 3½ feet. In bloom after the middle of July. Flower heads present a feathery appearance, having numerous cream-coloured flowers borne in large compound heads.

Spiræa filipendula, flore pleno.—Double-flowered Dropwort. Similar to the first-named spiræa, with double pure white flowers. Much admired.

Spiræa palmata elegans.—Japanese spiræa. Height 2 feet. In bloom during July. Flowers white, with crimson anthers, borne in panicles. A very desirable perennial.

Spiræa venusta.—Queen of the Prairie. Height 2½ feet. In bloom during the last of July and early August. Flowers pink, small, profusely borne in large panicles. A much desired pink spiræa.

Thalictrum aquilegifolium.—Columbine rue. Height 3½ to 4 feet. In bloom the middle of July. Flowers small, white, numerous, borne in loose panicles. A desirable sort.

COVER CROPS.

Cover crops of different kinds have been grown in the orchard here for a number of years. The primary object in growing such a crop in the orchard is to form a cover of vegetation that will serve as a protection to the roots of the trees during winter. Such a crop, however, is also of value from the fact that plant food not required by the fruit tree during the fall, and which is liable to be leached away by late fall or early spring rains, is taken up and held in a convenient form to turn under the following spring; adding, also, humus to the soil by which it is so greatly improved.

In growing cover crops, the aim is to get a fairly thick mat of vegetation, and also a mat that can conveniently be turned under the following spring. It is also advisable to grow one of those crops known as legumes, which enrich the soil by the addition of nitrogen assimilated from the air by means of bacteria on their roots. Common and generally available among these for cover crop purposes are the pea, vetch and clover.

It is very important that an orchard should be worked as soon in the spring as the ground is fit and kept in a good loose condition by frequent cultivation until the middle of July. This practice not only stimulates early active vegetation, but also conserves moisture. Moisture is generally abundantly supplied by frequent rains after this date and the ground can safely be put into a cover crop any time between the middle of July and August. Cover crops should not be sown later than the first of August to get a good mat of growth for winter protection. In 1903 the cover crops were sown July 29, and this season they were sown July 26. The following table gives notes taken upon their growth in 1903, and concerning the ease with which they were turned under in the spring :—

Cover Crop Sown.	Quantity of Seed sown per Acre.	Height of Growth, Oct. 31, 1903.	Character of Cover, Nov. 30, 1903.	Ease with which they were ploughed under, May 10, 1904.
	Bush.			
Peas	3	Growth of vine, 40 in.	Thick mat 3 to 5 in. deep, good cover.	Very difficult to get well turned under.
Oats	4	" straw, 30 in.	Thick mat 4 to 6 in. deep, good cover.	Very difficult to get well turned under.
Winter Rye	3½	5 inches	Fairly thick mat 5 to 6 inches, ground almost covered.	Easily ploughed under and worked.
Buckwheat	3	30 "	Thin covering 3 to 4 in. deep; leaves all gone, stalks only remaining.	Difficult to plough under; stalks gather ahead of the plough.
	Lbs.			
Sand Vetch	40	6 to 8 inches	Thick covering 2 to 3 in. deep.	Quite easily turned under.
Mammoth Red Clover	14	2 to 3 "	Thin mat, scarcely covered ground, 1 in. deep.	Easily ploughed under.
Crimson Clover	20	5 to 8 "	Thick mat 4 to 6 in. deep, covers ground well.	Easily turned under.

The experience gained here seems to indicate that Crimson clover is one of the best cover crops for use in orchards. It produces a good thick mat of nitrogenous material easily turned under and out of the way for future cultivation. Crimson clover is an annual, and only odd plants will stand the winter. The killing of the clover in the winter, however, is not considered a disadvantage because the ground is worked as soon as it is fit.

The cost of these different seeds per acre for sowing to cover crop, is as follows:—

3	bush. peas at 80 cents per bushel	$2 40
4	" oats at 40 cents per bushel	1 60
3½	" winter rye at 60 cents per bushel	2 10
3	" buckwheat at 50 cents per bushel	1 50
40	pounds sand vetch at 9 cents per pound	3 60
14	" mam. red clover at 14 cents per pound	1 96
20	" crimson clover at 8 cents per pound	1 60

SOIL MOISTURE EXPERIMENTS.

The object of these experiments was to obtain information relative to the moisture contents of soil when growing grain or grass crops as compared with that given clean cultivation from early spring until time for sowing a cover crop. The reason for obtaining this information was to see whether fruit trees growing in soil cropped with grain or grasses had sufficient moisture to make proper growth of wood and fruit during this part of the season.

Fruit trees make their wood growth during the first half of the season; consequently any check to this growth during June and July, should, if at all possible, be prevented, especially for young trees. Grasses and grain crops make their growth principally during the first part of the summer and require large quantities of water for their full development. After this water has been taken up by the roots and performed its function in plant growth it is transpired from the leaves in the form of vapour. This taking up of the soil moisture would probably, if the rainfall during the season were light, provided these crops are grown within the root area of the tree, deprive the tree of the necessary moisture for proper growth.

The soil of these plots was of as uniform a character as could be had, a clay loam with a heavy clay subsoil, and underdrained. plots were 36 feet wide and 250 feet long. The samples, however, were taken from plots each 36 x 36 feet ; the plots adjoining each other. The soil was taken up by means of galvanized iron cylinders, which were 14 inches long. These were driven into the ground and the column of soil to that depth obtained for each set of samples. Two canisters of soil were taken from a plot at each date, and each canister was taken at a different place in the plot. The places where samples were taken from were marked, and future samples, in case the moisture contents would be affected thereby, were taken sufficiently far from these to represent fairly accurately the percentage of moisture in each plot. The soil samples were sent to Ottawa in air-tight cans to prevent any loss of moisture.

I am indebted to the Chemist of the Experimental Farms, Mr. F. T. Shutt, for the data in the following table, giving the percentage of moisture in the samples of soil from these plots which were sent to him every two weeks during the season.

PERCENTAGE of Moisture in soil of plots sent from the Experimental Farm, Nappan, N.S.

Date when Samples were taken.	Plot No. 1.	Plot No. 2.	Plot No. 3.	Plot No. 4.	Plot No. 4 *a*.	Plot No. 5.
	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.
May 12	18·41	20·00	18·09	20·88	.....	18·93
" 26	17·21	18·02	18·43	21·21	22·42	18·97
June 9	12·52	17·84	19·24	20·31	17·50	14·04
" 23	10·46	17·40	17·71	20·46	19·78	11·65
July 7	9·06	16·70	17·46	19·14	19·13	11·22
" 21	7·46	13·43	16·35	20·54	17·50	12·06
Aug. 4	8·23	9·49	15·10	18·11	17·74	10·36
" 18	9·80	10·30	15·71	20·26	21·04	13·66
Sept. 6	17·79	16·99	20 13	24·04	24·02	20·22
" 20	14·91	16·31	17·99	18·09	18·57	16·87
Oct. 31	21·33	19·77	21·42	26·02	26·53	19·71

HOW PLOTS WERE TREATED.

Plot No. 1.—Plot No. 1 was in potatoes in 1903, and was seeded to winter rye September 21, 1903. The rye was sown at the rate of two bushels per acre, together with Red clover at the rate of 10 pounds per acre. The rye made strong growth of about 50 inches and was harvested August 3. The clover sown with it made very poor growth.

Plot No. 2.—This ground was given clean cultivation during the spring and early summer of 1903, and was seeded to Crimson clover at the rate of 20 pounds per acre July 27, 1903. The clover made a strong growth of from five to seven inches, which in the following spring was practically all dead. The ground was ploughed May 26 to a depth of five inches, and on the 29th was worked up with the disc and springtooth harrows. It was again worked June 13 and 20, once each with the springtooth and smoothing harrows. On June 20 it was seeded to oats at the rate of three bushels of seed per acre.

Plot No. 3.—This plot was in Crimson clover the previous season and had been treated in a similar manner to plot 2. The ground was ploughed this spring as soon as fit, May 13, and harrowed once each with the disc and springtooth harrows on May 29. It was again worked in the same manner on June 20 and 29 and July 7. On July 7 this ground was worked up also with the spade harrow. Alfalfa clover was then sown at the rate of 25 lbs. per acre, drilled in with the grain seed drill. The Alfalfa started quickly and made strong growth, attaining an average height of 12 inches.

Plot No. 4.—This ground was treated similar to plots Nos. 2 and 3 during the season of 1903. The ground was ploughed as soon as fit on May 13 and worked up with disc and springtooth harrows. The land was again worked once each with the disc and springtooth harrows on May 29, June 20 and 29, and on July 7, 13 and 25. On July 25 Crimson clover at the rate of 20 lbs. per acre was sown broadcast and harrowed in lightly with the smoothing harrow. This clover started well and made strong growth, giving a thick mat from 5 to 7 inches deep.

Plot No. 5.—This plot was worked up in the spring of 1903 and seeded to oats June 24 at the rate of three bushels per acre, with 5 lbs. Mammoth Red clover, 3 lbs. Alsike and 12 lbs. Timothy per acre. The growth of grain was good and was used for green feed early in September. The catch of clover was good. The growth of clover this season was strong and was cut for green feed June 23, when about two feet high. A second growth of clover started up and quite a growth of Timothy also appeared. The second growth made quite a mat of from 4 to 7 inches, which still remains.

WINTER RYE.

Plot No. 1.—Winter rye is not generally grown here, but was selected for one plot principally to show the drying effect of grain crops on soil. This plot, as compared with the clean cultivated plot, shows a marked difference in percentage of moisture, especially during June, July and August. The rye crop had ceased to grow by August 1, but not until the heavy rain on August 21 did this ground which had been so thoroughly dried out by the rye become sufficiently moist to admit of growth of the clover sown with the rye. It will be seen by referring to the following table that from July 23 to August 21, 2·28 inches of rain fell, yet the ground remained practically the same in moisture content. A thoroughly dried soil does not absorb water quickly, and drying weather generally prevailing at this time of the year quickly evaporates the water from the top soil before it penetrates to much depth. This shows that ground that has been dried out by such crops require very heavy rains to wet it to a sufficient depth for the moisture to be available for the fruit tree. One inch of rain will make the surface of such a piece of land quite wet, but, still not supply the tree with required moisture. When the soil samples were taken August 4, the surface of the plot was quite damp but the soil below was still thoroughly dried out and did not become moist until after the rainfall on September 3 and 4.

Plot No. 2 was ploughed two weeks later than plot No. 3, to determine the effect if any of inverting the top soil by ploughing to check the capillary flow of soil water. A reference to the results obtained will show that there was little difference in the percentage of moisture in these two plots up to July 9. It will also be seen that these plots both had a Crimson clover cover crop in 1903 which died during the winter and left a dead mat, which acted as a mulch preventing No. 2 plot from drying out as much as it actually would have done had this decaying mass not been there. The intention was to sow No. 2 and No. 3 plots to oats after working the land on the last of May, and by taking samples from each throughout the season determine what effect early working of the land had in checking the escape of moisture from the land and holding it for the use of the crop later on; but, owing to circumstances unavoidable grain was not sown until June 20. Plot No. 2 was seeded to oats June 20, and plot No. 3 was seeded to Alfalfa on July 7.

Plot No. 4 was given clean cultivation to July 25. The data in the column marked 4*a* represent the moisture in the soil to a depth of only 5 inches. The object was to see how the top 5 inches of soil compared in moisture content with that to a depth of 14 inches.

Plot No. 5, it will be seen, was next to plot 4. Quite a striking difference in percentage of moisture between these two plots is shown.

The following table gives the rainfall and the date on which the rains occurred from March 31 to December 1, 1904:—

RAINFALL, 1904.

April.		May.		June.		July.		August.		September.		October.		November.	
Date.	Ins.	Date.	Ins.	Date.	Ins.	Date.	Ins.	Date.	Ins.	Date.	Ins.	Date.	Ins.	Date.	Ins.
9	·28	10	·17	3	·07	1	·24	1	·13	1	·08	6	·23	4	·77
10	·39	17	·29	5	·74	3	·36	11	·63	3 & 4	1·24	10	·06	6	·07
12	·26	19	·93	7	·07	5	·07	15	·23	6	·66	11	·23	14	1·23
16	·11	21	·05	12	·10	8	·03	17	·29	8	·04	13	·97	18	·47
19	·94	24	·10	18	·04	13	·40	18	·08	12	·26	15	·08	24	·68
21	·26	25	·13	22	·46	20	·03	21	1·70	15	·30	22	2·98	29	·17
29	·16	27	·03	25	·12	23	·69	23	·43	21	·23	26	·18	..	..
30	·52	30	·06	30	·14	29	·23	25	·02	25 & 26	1·20	3	·27	.....	..
.....		.....		.....		.....		.....		29	·15	.....		.....	....
.....		.....		.....		.....		.....		30	·36	.....		.....	..
Total.	2·92	..	1·76	..	1·74	..	2·15	..	3·51	..	4·52	..	5·00	..	3·39

The total Rainfall for the same period in 1903 was :—

..	3·57	..	0·68	..	2·29	..	2·07	..	2·40	..	3·63	..	5·78	..	7.98

CABBAGE ROOT MAGGOT.

The Cabbage Root Maggot has given considerable trouble during the past few years, but this season they were much more numerous than usual, and proved very destructive to all the plots of cabbage and cauliflowers, except two plots where hellebore was used. An examination of the cabbage plots early in June showed that many eggs were being deposited near the surface of the ground at the base of the plant. Experiments were tried with various mixtures to determine their effect in controlling this pest. Accordingly nine plots were staked off containing 100 plants each. These plants were in a fairly vigorous state, having been set early in May. The plots were treated with the following mixtures:—

No. 1.—Hellebore 2 oz. to 1 gallon of water.

No. 2.—Hellebore 4 oz. to 1 gallon of water.

No. 3.—Kerosene emulsion, 1 part kerosene oil to 4 parts water.

No. 4.—Kerosene emulsion, 1 part kerosene oil to 6 parts water.

No. 5.—Kerosene emulsion, 1 part kerosene oil to 9 parts water.

No. 6.—Kerosene emulsion, 1 part kerosene oil to 12 parts water.

No. 7.—Paris green 2 oz. to 10 gallons water.

No. 8.—Tar paper disks.

No. 9.—No treatment.

These plots were treated June 18. An examination of a number of the cabbages at this date was made and no maggots could be seen. Some young maggots were found and eggs were being hatched around some of the cauliflowers at this date. The cauliflowers, however, were not included in this test. Notes were taken July 7, 14 and August 16. A summary of the data collected is given in the following table:—

No.	How Treated.	Killed by kerosene emulsion.	Killed by root maggot.	Injured by root maggot and did not recover.	Injured by kerosene emulsion and did not recover.	Weak growth.	Fair growth.	Vigorous growth.
		Plants.	Plants.	Plants.	Plants.	Plants.	Plants.	Plants.
1	Hellebore—2 oz. to 1 gall. water	.....	.....	.....	.....	.....	6	94
2	Hellebore—4 oz. to 1 gall. water	.....	.....	.....	.....	.....	7	93
3	Kerosene emulsion—1 part oil to 4 parts water	36	17	23	14	9	1	.....
4	Kerosene emulsion—1 part oil to 6 parts water	30	16	16	17	17	4	.....
5	Kerosene emulsion—1 part oil to 9 parts water	11	27	41	.....	11	6	4
6	Kerosene emulsion—1 part oil to 12 parts water	.....	36	41	.....	14	8	1
7	Paris green—2 oz. to 10 gall. water	.....	29	39	.....	27	3	2
8	Tar paper disks put on June 1	.....	27	36	.....	22	11	4
9	No treatment	.....	62	20	.....	12	6	.....

It will be seen that kerosene emulsion in this test has given unsatisfactory results. It appears that an emulsion stronger than one part of oil to nine of water will do serious injury, and that a weaker strength does not appear to have much effect on the eggs or maggot. The kerosene emulsion was applied with a force pump using a single jet of liquid, forcing about a cup full of the mixture into the soil around the base of each plant.

The tar paper disks put around the plants on June 1, did not give as good results as expected. This may possibly have been due to the disks not having been put around the plants early enough. The object of these disks is to prevent the insects from depositing their eggs, which it is claimed they will not do, if these disks are fitted closely around the plant at the surface of the ground.

The hellebore and water recommended by Dr. James Fletcher, Entomologist and Botanist of the Experimental Farms, exceeded expectation, and no root maggots could be found around any of the plants examined in these two plots. The cabbage in these two plots were the only good ones out of some 1,500 plants set. There was no noticeable difference between plot No. 1 and 2, and the heads averaged practically the same. The hellebore was mixed with water and applied with a force pump in the same manner as the emulsion. An equally good way, we should fancy, would be to move some of the earth back from the base of the plant and pour about a cup full of hellebore water into this hollow around the plant. About one cupful of liquid was used to a plant in these plots. Further experiments will be carried on with this material. As far as one can judge from a single season's experience, we are inclined to think that this will prove an excellent remedy for the root maggot. The cabbages were equally infested at the base of the root with eggs when the mixture was used.

CUTWORM—POISONED BRAN REMEDY.

The Red-backed Cutworm *Paragrotis ochrogaster* was extremely troublesome around the flower beds and in the vegetable plots this season. It was found, however, that this pest could be easily controlled by using the poisoned bran bait recommended by Dr. James Fletcher. The poisoned bran is scattered on the ground around the plants, and if fowl are allowed to run where it has been used there is considerable danger. We found that chickens were killed by picking up pieces of the bran six weeks after it had been applied.

Dr. Fletcher advises one pound of Paris green to 80 pounds of bran, which is equal to 1 oz. of Paris green to 5 pounds of bran. The quantity used here was 3 ounces to 10 pounds of bran. The method adopted was to mix 3 ounces of Paris green in a quart bottle nearly full of water by shaking violently. This was added to a little over one-half gallon of water and poured slowly into the bran while it was being stirred with a stick. It is very important to mix the Paris green water thoroughly with the bran in order to get each flake of bran coated with some of the Paris green particles. The bran should be dampened just sufficiently to scatter nicely for if it is too wet this cannot be done to so good advantage.

Ten pounds of bran mixed in this way was found to do 500 feet of a row thoroughly. After it was used in this quantity, on beans where the cutworm was doing the most damage, few plants could be found cut off after the first night, and after the second night no plants were found destroyed. For plants, a greater distance apart, less bran would be required, for it is necessary to only scatter a ring of bran around each one.

The cutworm feeds during the night, cutting off the plant at the surface of the ground. They appear to have a fondness for bran and will feed upon it in preference to plants. A case particularly striking was noticed in the flower garden this year. Bran bags were used to protect some tender annuals from a June frost, and out of one of the bags a handful or two of bran happened to be deposited in one place. This ground was stirred in weeding about a week after and it was noticed that cutworms were collected in the soil under the bran while plants uninjured were close by. On a close examination, eight cutworms were found together, they evidently finding the bran a more suitable and convenient material to feed upon. Experience shows that this is a practical and efficient remedy for controlling this pest.

GARDEN PEASE.

Experiments were conducted with six of the leading early sorts of garden pease to find out the number of pounds of marketable green pease in pod from each. The plots were two rows, each 66 feet long, equal to 1-165 of an acre. These were all fertilized at the rate of 500 lbs. complete fertilizer per acre. The seed was sown May 12, in rows 2 feet apart, and the seed was dropped 2 inches apart in the rows. The soil was a poor sandy loam. The following yields were obtained per acre. Owing to the very dry season these peas did not grow well, and the yield per acre was small:—

Name of Variety.	Date of First Picking.	Pounds from First Picking.	Date of Second Picking.	Pounds from Second Pick'g.	Yield per Acre.
					Lbs.
Stacion	July 12	33	July 18	10	7,095
Thos. Laxton	" 14	25	" 21	20¼	7,507
Gradus	" 14	28¼	" 21	12¾	6,765
Prosperity	" 14	28¾	" 21	9½	6,270
Nott's Excelsior	" 14	29	" 24	18¼	7,796
American Wonder	" 14	6½	" 24	42	8,001

FERTILIZER EXPERIMENTS WITH GARDEN PEASE

Experiments were conducted with two kinds of early garden pease by dividing the land devoted to each into three plots. On one complete fertilizer, 'Imperial' brand, at the rate of 500 lbs. per acre was used, on another 250 lbs. per acre, and on the other third, no fertilizer was used. The seed was sown May 12 in rows 2 feet apart, and the seed dropped 2 inches apart in the row. The soil was a light clay loam in a poor state of fertility. Each plot was 2 rows, each 66 feet long. The growth of vine was short and the yield not as large as usual. The yield obtained from these plots is given in the following table.

If we consider the weight of green peas in pod at 40 lbs. to the bushel, we find that we have a gain in the first variety tested of 44 bushels per acre, where 500 lbs. of fertilizer was used per acre, than where not fertilized. If we allow pease in the pod to be worth 30 cents per bushel, we have a gain of $13.20 per acre. The fertilizer cost $7.50 per acre—a net gain of $5.70 per acre in favour of the heavily fertilized plot. With the variety Thomas Laxton there is a still larger gain from the use of the fertilizer.

GARDEN PEASE—FERTILIZER EXPERIMENTS.

Name of Variety and how treated.	Date of First Picking.	No. of Pounds from First Picking.	Date of Second Picking.	No. of Pounds from Second Picking.	Total Yield per Acre in Pounds.
'Station'—Complete fertilizer, 500 lbs. per acre	July 12...	33	July 18...	10	7,095
Complete fertilizer, 250 lbs. per acre	" 12...	31½	" 18...	10	6,847
No fertilizer	" 12...	27	" 18...	5¼	5,321
'Thomas Laxton'—Complete fertilizer, 500 lbs. per acre	" 14...	25	" 21...	20¼	7,507
Complete fertilizer, 250 lbs. per acre	" 14...	23	" 21...	13¾	5,987
No fertilizer	" 14...	23¼	" 21...	8	5,156

SNAP BEANS.

Experiments were conducted with fifty-four varieties of snap beans. The seed was planted May 30, being dropped 2 inches apart in the row and the rows 2 feet apart. The ground was previously in horse-beans and was manured in the fall of 1903 with 15 one-horse cart loads af stable manure per acre and ploughed. This spring the ground was worked up into good tilth with the spade, springtooth, and smoothing harrows. The plots were one row, 33 feet long. A duplicate plot of one row 33 feet long was also planted which was allowed to ripen if the season permitted. These were cultivated frequently to keep the ground loose and friable.

These beans made fair growth. The cutworm did some damage, but was quickly checked by using the poisoned bran mash, which was scattered along the row. The rust *Anthracnose* did not develop on the beans until after the middle of August, when some of the plots were attacked quite badly. Some of these varieties which have in the past appeared quite rust-proof, were this year the worst affected, and some sorts that were formerly badly attacked were this season quite free.

From experience gathered from time to time, it would appear that the varieties Bountiful and Improved Goddard are two of the best green podded sorts for general market. Refugee or 1,000 to 1 is an excellent late green podded sort, and Market Wax, Keeney's Rustless Wax and Valentine Wax, are three excellent golden-podded kinds. The following notes were taken from the plots tested :—

SNAP BEANS—TEST OF VARIETIES.

Name of Variety.	When first fit to use.	First Picking, Aug. 4.	Second Picking, Aug. 12.	Third Picking, Aug. 23.	Total Yield from plot.	Length of Pod.	Colour of Pod.	Form of Pod.	Remarks.
		Lbs	Lbs	Lbs	Lbs	Inch's			
Extra Early Edible Podded	July	28	5¾	4	2¼	12	4½—5	Green..	Round..	Stringless, good, no rust.
Haricot or Golden Skinless	"	28	6	5	2¾	13¼	4 —4½	Golden.	" ..	" "
Emperor of Russia	"	28	4¾	6	4	14¾	5½—6	Green..	" ..	" "
Matchless	"	28	5	4¾	3	12¾	5 —5½	" ..	" ..	Stringy, fair "
Dwarf German Black Wax	"	28	5½	10½	4½	20¼	4½—5½	Golden.	" ..	Few strings, good "
Green Pod Lightning	"	28	7½	4¾	2¾	15¼	4¾—5¼	Green..	Flat...	" "
Valentine Wax	"	28	6½	11	9¼	26¾	5 —5¼	Golden.	Round..	Stringless, good "
Early Warwick	"	28	11½	8	7¾	27	4½—5	Green..	Flat....	Some strings, fair "
Dwarf Horticultural	"	28	6¾	12¾	6¾	26¼	5 —5½	" ..	"	Stringless, good "
Davis Kidney Wax	"	28	5½	9	4¼	19	5¾—6½	Golden.	"	" some rust.
Bountiful	"	28	9¾	15½	6¼	31¼	6 —7	Green..	"	" no rust.
Brittle Wax	"	28	4	4	3	7¼	4½—5½	Golden.	Round..	" slight rust.
Grencell's Rust Proof	"	28	3½	7	2½	13	4 —4½	" ..	Flat....	" "
Market Wax	"	28	3¼	8½	5¼	17¼	5 —5¾	" ..	"	" no rust.
Currie's Rust Proof	"	28	5½	9¼	1¼	16	5¼— 6	" ..	"	Some strings, fair, some rust.
Davis' Dwarf White Wax	"	28	3¾	6	3½	13¼	6 —6¾	" ..	" ..	Stringless, good, some rust
Early Mohawk	"	28	1¾	5	5¾	12½	5¼—5¾	Green..	"	Some strings, fair, no rust.
Wardwell's New Kidney	"	28	5½	4	3¼	12¾	5¼— 6	Golden.	"	Stringless, good, some rust
Flageolet Wax	"	28	3¾	5½	2½	11¾	6 — 7	" ..	"	" "
Early China	"	28	3½	4¾	1¼	9	4¾—5¼	" ..	"	Some strings, fair, no rust
Keeney's Rustless	"	30	5½	8	1¾	15¼	5¼—5¾	" ..	"	Stringless, good, some rust
Improved Golden Wax	"	30	2½	8¾	3	14¼	4 —4½	" ..	"	" fair, slight rust
Perfection Wax	"	30	1½	7	3¾	12¾	6¼—7¼	" ..	"	" good "
Golden Crown	"	30	2½	6¼	4½	13¼	4 —4½	" ..	Round..	" no rust.
Extra Early Refugee	"	30	3½	7½	2¼	13¾	4¾—5¼	Green..	" ..	" "
Saddle Back Wax	"	30	2	5¼	2	9¼	4½—5	Golden.	" ..	" slight rust
Round Yellow Six Weeks	"	30	1½	4¾	2½	8¾	4½—4¾	Green..	" ..	" no rust.
Ne Plus Ultra	"	30	4	5¾	1¾	11½	5¼—5¾	" ..	Flat....	Some strings, fair, no rust.
Blue Podded Butter	"	30	1¼	5	1¾	8	5½—6	Blue ...	"	Stringless, good "
Don Carlos	"	30	3½	3¼	1¼	8	4 —4¼	Green..	"	Some strings, fair, no rust.
Early Giant Wax	"	30	2	6¼	2¾	11	5¼— 6	Golden.	"	Stringless, good "
Best of All	"	30	2¼	4¾	2¾	9¾	5¾—6¾	Green..	"	" "
Challenge Black Wax	Aug.	3	3¾	3	7¼	4½— 5	Golden.	Round..	"	some rust.
Early Golden Eye	"	3	1¼	4½	1¾	8	4½—5	" ..	Flat....	Some strings, fair, no rust.
Long Yellow Six Weeks	"	3	2½	7½	2	12	5¾—6¼	Green..	"	Stringless, fair "
Longfellow	"	3	1¼	9	3	13¼	5 —6¾	" ..	Round..	" good, slight rust
Knickerbocker	"	3	1½	5¾	4½	11¾	5 —5¾	" ..	" ..	" some rust.
Stringless Wax	"	3	1½	11½	7¼	20¼	5¾—6½	Golden.	Flat....	" "
Golden Scimitar	"	4	1¼	2¾	2	5½	5 —5½	" ..	Round..	" slight rust
Earliest Red Valentine	"	4	¼	4½	2	7	4¼—5	Green..	" ..	" no rust.
Improved Goddard	"	4	½	8	14¾	24	6 —6½	" ..	Flat....	" "
White Kidney	"	4	½	4¾	9½	14¾	5 — 6	" ..	"	Some strings, fair "
Fame of Vitry	"	4	2¾	8	16¼	26½	6 —7	" ..	"	Stringless, good "
Refugee Wax	"	4	½	9¾	1	11¼	4 —4¼	Golden.	Round..	" "
Cylinder Ivory Podded	"	4	1	3½	3	7¼	4½—5¼	" ..	" ..	" slight rust
Dwarf Chocolate	"	4	½	6	3	9½	5 — 5¾	Green..	" ..	Some strings, fair, no rust.
Pencil Pod Wax	"	4	¾	3¼	1¼	5¼	4¾—5¼	Golden.	" ..	Stringless, good, some rust
Giant Stringless	"	4	¼	4½	2	7¼	4¾—5¼	Green..	" ..	" "
Burpee's Stringless	"	4	1½	3¾	1¾	7	4½—4¾	" ..	" ..	" no rust.
Royal Dwarf Kidney	"	4	½	2¾	6	9¼	4½— 5½	" ..	Flat....	Stringless, fair "
Cream Valentine	"	4	1¼	4¾	4	10	4¼—4¾	" ..	Round..	" good "
Refugee or 1,000 to 1	"	12	....	4½	8½	12¾	4½—5¼	" ..	" ..	" "
Black Speckled	"	12	....	10	5½	15½	6½—8	Green..	Flat....	Some strings, fair, no rust.
Eclair	"	12	...	3¼	6	9¼	6½—8½	" ..	Round..	" "

ONIONS.

The ground on which the onions were grown was in a fairly good state of fertility. The soil was a light clay loam well drained but lacking somewhat in humus; so essential to make it an ideal soil for this crop. The best soil for onions is a light clay

loam abounding in decomposed vegetable matter, and well drained either naturally or artificially. Almost any good garden soil can be put into shape to grow a good crop of onions by using a liberal supply of manure for one or two years in succession to get a large supply of readily available plant food. The ground should be manured in the fall and ploughed under. In the spring this can be ploughed again and the manure thoroughly incorporated by using the disc and springtooth harrows. Poor soil will not produce good onions, and it requires several years of enriching to bring such soil into condition for the successful culture of the crop. The same ground can be used year after year unless disease or root maggots attack the crop, in which case a change is necessary.

The ground on which these onions were grown was previously in roots and was manured in the fall of 1903 with fifteen one-horse cart loads of stable manure per acre, which was ploughed under. It was again manured this spring with fifteen one-horse cart loads of stable manure per acre. The ground was worked into good tilth and the manure thoroughly mixed with the soil, and was run into rows two feet apart.

Complete fertilizer at the rate of 500 lbs. per acre was sown broadcast and lightly harrowed in with the smoothing harrow before the rows were run up. This crop requires a liberal amount of plant food in a readily available form, consequently, the liberal use of commercial fertilizer is necessary. A complete fertilizer is the best; that is one containing nitrogen, potash and phosphoric acid. Wood ashes can be used to good advantage to supply potash.

This ground was intended for roots and was run into rows 24 inches apart. These rows were raked down somewhat and the plots set in rows 2 feet apart. Onions are usually set in rows one foot apart on the level ground. The yield per acre on these plots is calculated from the number of pounds obtained from one row 66 feet long, allowing two feet of space for each row or equal to 1-330 of an acre for each plot; consequently, had these been grown in rows one foot apart the crop yield per acre would have been larger than what is given in this report.

Owing to the shortness of the season here satisfactory results cannot be had from growing onions from seed sown in the ground, although the variety Extra Early Red, will do fairly well in this way. The practice now followed is to start the plants in the hot-bed and transplant to the open ground. The transplanting does not entail much more labour than thinning the plants of seed started in the open.

The seed for these plots was sown in boxes, 15 by 30 inches, holding six inches deep of soil, on March 24. The seed was planted in drills ¾ of an inch deep in rows 3 inches apart, using 10 to 12 seeds per inch. It requires 6 or 7 weeks from the date of sowing to get good plants for transplanting. The soil used in these boxes was a rich loose sandy loam. The boxes were set into a hot-bed made March 9, which had a good even bottom heat. They were given ventilation on warm days, and sufficient moisture was supplied to produce good thrifty growth. Onions should not be forced in the hot-bed, as a spindling growth is not wanted, and makes very unsatisfactory plants for transplanting. After May 1 the glass is left off the hot-beds entirely. This hardens up the plants for setting in the open.

Transplanting to the open should be done as early in May as possible, and the nearer the plants can be got to about the size of a lead pencil at this time the better. The boxes were taken to the field when ready for transplanting, May 21. The plants were set 3 inches apart, using a garden line to set by. They were set as deep as the plants were in the starting box. The crop was frequently cultivated to kill weeds, keep the ground loose and friable, conserve moisture, admit air and allow the bulbs to readily develop.

Harvesting should be done when the most of the necks have turned yellow and are considerably withered. It is not advisable to defer this operation much after the middle of September. Even at this time some green tops will be found in the earliest maturing varieties, but they will soon dry up after harvesting. They should be pulled and left in rows for a week or ten days. If there is danger from frost they should be

stored in a shed or barn floor and left dry, after which they can be topped and sorted for market.

The best onion for the average grower is the Australian Brown. For the experienced market gardener the Prize taker will prove the most profitable. The following table gives the date on which these plots were pulled and the yield per acre.

ONIONS—TEST OF VARIETIES.

Name of Variety.	When Harvested.	Yield per Acre.		Size of Onion.	Colour of Skin.	Remarks.
		Bush.	Lbs.			
Prizetaker	Sept. 23	342	40	Large	Yellow	Fairly well matured. Large cropper.
Trebon's Large Yellow	" 23	330	00	"	"	Not well matured.
Australian Brown	" 13 & 23	228	15	Medium.	Brown	Well matured. One of the best.
Golden Globe	" 13 & 23	228	00	"	Yellow.	" " "
Australian Yellow Globe	" 13 & 23	214	30	"	"	" " "
Yellow Globe Danvers	" 23	156	45	Large	"	Not well matured.
Large Red Wethersfield	" 23	154	00	"	Red	" "
Red Wonder	" 13 & 23	148	30	Medium	Brown	Well matured. Apparently a strain of Australian Brown.
Market Favourite	" 23	137	30	Large	Yellow	Not well matured.
Extra Early Red	" 13	137	30	Medium	Red	Well matured. A good flat early kind.
Vanguard	Aug. 16	111	22	"	White	Well matured. Good for early market.
Mammoth Silver King	" 24	83	52	Large	"	Well matured. Did not do as well as usual.
Paris Silver Skin	" 24	60	30	Small	"	Well matured. Good for pickling.

SQUASH, PUMPKINS AND CITRON MELON.

Eight of the leading varieties of squash, two of pumpkins and one of citron melon were started May 9 in strawberry boxes filled with earth, set in the hot-bed. These were kept quite cool and were not forced, but made a good strong growth. They were set into hills in the open ground June 1 by cutting the boxes and setting the plants without disturbing the soil around the roots. Five seeds were put into each box, and after they started all but three plants to a box were thinned out. Three of these boxes were set to a hill and later on the plants were thinned out to six plants to a hill.

The hills into which these were set were made May 28 by digging out some of the top soil to a depth of six inches, two feet long and one foot wide, and putting into and tramping manure to a depth of four inches and covering with three or four inches of soil. The plants from the boxes were set practically on the manure.

A duplicate set of the plots started in the hot-bed were started by planting the seed in these hills May 28. About one dozen seeds were planted to a hill, and they were later thinned to six plants to a hill. These hills after planting were covered with a 12 x 20 glass set on a frame of wood, three inches high. Under this enclosure

the seed quickly germinated and by the middle of July the plots were apparently as far advanced as those started in the hot-bed. After the plants have appeared under this glass, the glass should be removed during part of bright days, and after the middle of June should be removed altogether. The hills were 12 feet apart each way.

The first cutting was made from these plots September 2, when the then matured squash were gathered and weighed. The balance of the crop was harvested September 21. There appears to be little difference between the two sets of plots. The Boston Marrow is probably the best autumn squash, and the Hubbard the best winter squash.

The Warted Hubbard is similar to the Hubbard, except that it has a rougher shell. It has proven to be a heavier cropper also than the Hubbard tested here. The Golden Hubbard is an excellent sort, but small. The following crop was taken from these plots:—

SQUASH, CITRON MELONS AND PUMPKINS—EXPERIMENTS WITH.

Name of Variety.	How Started.	Sept. 2.		Sept. 21.		Total Number Harvested	Total Number of pounds from Hill.	Average Weight of Squash Harvested.	Colour.
		Number Harvested.	Weight.	Number Harvested.	Weight.				
SQUASH.			Lbs.		Lbs.		Lbs.	Lbs.	
Hubbard	Outside...	1	8	4	40½	5	48½	9·7	Green.
	Hotbed...	1	15½	4	29½	5	45	9·	
Warted Hubbard	Outside...	2	31	4	54	6	85	14·1	"
	Hotbed...	2	39½	5	46	7	85½	12·2	
Golden Bronze	Outside...	1	16½	6	39½	7	56	8·	Dark grayish green.
	Hotbed...	1	10	7	47½	8	57½	7·2	
Bay State	Outside...	2	19¾	4	29½	6	49¼	8·2	Blue.
	Hotbed...	2	20½	4	36	6	56½	9·4	
Boston Marrow	Outside...	5	40	3	33½	8	73½	9·2	Bright orange.
	Hotbed...	3	32½	3	32	6	64½	10·7	
Dunlop's Early Marrow	Outside...	4	46	6	42¼	10	88¼	8·8	Orange yellow.
	Hotbed...	4	37½	3	31	7	68½	9·8	
Golden Hubbard	Outside...	4	33	5	29	9	62	6·9	Deep orange yellow.
	Hotbed...	4	28¼	3	18½	7	46¾	6·6	
Essex Hybrid	Hotbed...	3	34	2	14	5	48	9·6	Orange yellow.
CITRON MELON.									
Colorado Mammoth, Preserving.	Outside...	2	21	8	48	10	69	6·9	
	Hotbed...	7	68¾	5	33	12	101¾	8·5	
PUMPKINS.									
Sugar	Outside...	2	10¾	8	49	10	59¾	5·9	Deep orange, good keeper,
	Hotbed...	2	13½	9	41¼	11	54¾	4·9	excellent quality.
Jumbo	Hotbed...	1	28½	2	57	3	85·5	28·4	Large yellow.

LIST OF THE BEST VEGETABLES TO GROW.

The following list of vegetables are considered the best for general culture. We find from our tests that a number are practically of equal merit; yet, we feel safe in recommending the following as equal to any of the different sorts of vegetables tested here:—

Pease.—Extra early: Surprise. Early: Thomas Laxton, American Wonder, Nott's Excelsior. Medium: McLean's Advancer, American Champion. Late: Juno, Heroine and Stratagem. The height of these as recorded this year are: 22, 30, 19, 16, 30, 32, 16, 24 and 14 inches respectively.

Tomatoes.—Sparks' Earliana.

Beans.—Green Pod. Early: Bountiful and Improved Goddard. Late: Refugee or 1,000 to 1. Golden Pod: Market Wax, Valentine Wax and Keeney's Rustless Wax.

Corn.—Extra early: Extra Early Beverly. Early: Extra Early Cory and Premo. Medium: Crosby's Early.

Cucumbers.—White Spine. The Cumberland is excellent for pickling.

Squash.—Autumn: Boston Marrow and Golden Hubbard. Late: Hubbard.

Parsnips.—Hollow Crown and Improved Half Long.

Carrots.—Chantenay.

Onions.—Prizetaker and Australian Brown.

Lettuce.—Curled: Black Seeded Simpson. Cabbage: Improved Salamander, Cos Trianon.

Cabbage.—Extra early: Paris Market. Early: Jersey Wakefield. Medium: Early Spring and Succession. Late: Late Flat Dutch, Late Red, Red Dutch.

Celery.—Paris Golden Yellow Self-Blanching, Improved White Plume and Winter Queen.

Cauliflowers.—Early Snowball and Early Dwarf Erfurt.

Beets.—Eclipse.

Spinach.—Victoria.

Salsify.—Sandwich Island.

Radishes.—French Breakfast and Icicle. Winter: Long Black Spanish.

Parsley.—Double Curled.

Citron Melon.—Colorado Mammoth.

Peppers.—Cayenne.

Water Melon.—Cole's Early and Phinneys' Early.

Egg Plants.—New York Improved Purple.

Brussels Sprouts.—Improved Dwarf.

Kale.—Scotch Dwarf Green Curled.

Asparagus.—Conover's Colossal.

Rhubarb.—Victoria and Linnæus.

Turnips.—Early: Extra Early Milan and Golden Ball. Swede: Selected Purple Top.

I have the honour to be, sir,
Your obedient servant,

W. S. BLAIR,
Horticulturist.

EXPERIMENTAL FARM FOR MANITOBA

REPORT OF S. A. BEDFORD, SUPERINTENDENT.

BRANDON, MAN., November 30, 1904.

To DR. WM. SAUNDERS,
Director Dominion Experimental Farms,
Ottawa, Ont.

SIR,—I have the honour to submit, herewith, my sixteenth annual report, with details of experiments undertaken and work accomplished on the Brandon Experimental Farm, during the year.

The past winter was a very cold and stormy one, the last half of January and all of February being particularly so, heavy drifts formed during March and April, filling bluffs of timber and ravines to their full capacity, in some instances native poplar trees were completely stripped of their branches by the weight of snow.

When the immense drifts of snow commenced to thaw, all the rivers rose to unusual heights and overflowed their banks. The flood prevented the sowing of grain on a portion of this farm, so the land was summer-fallowed and is now ready for next year's seeding.

Spring opened late, the first sowing was done here on April 28, fully three weeks later than the average.

The month of May was seasonable. June set in wet, and vegetation grew very rank and soft during the first two weeks of that month.

During the latter part of July and the beginning of August rains were very abundant throughout the province, and growth rapid.

The autumn was unusually favourable for harvesting and crops of all kinds were saved without injury from rain or snow.

A large amount of fall ploughing has also been done, which will allow of rapid seeding next spring.

Although there has been some loss from rust and frost, the injury has been quite local in its character, prices for produce have been higher than usual and the year was a profitable one for the farmer.

On the experimental farm the yield of wheat, owing to the ravages of rust, was only an average crop, but nearly all other products gave the largest returns in the history of the farm.

I beg to call your attention to the following experimental work undertaken here this year for the first time :—

The effect of early harvesting in lessening the injury to wheat by rust.

The results of sowing flax on newly broken virgin soil.

The suitability of flax stubble for different grain crops.

Growing clover in large fields with green fodder as a nurse-crop.

The improvement of pasture fields.

The fattening of swine on pease growing in the field. Barley compared with mixed grain for fattening swine. A comparison of one-year-old, with two-year-old steers for fattening purposes.

The use of incubators in raising poultry.

WHEAT.

The past season will be long remembered among the farming community, owing to the alarming reports prevalent regarding injury to our staple crop from rust.

As a rule this province is not subject to serious injury from rust in wheat, but the abundant rains of June and July, accompanied by several close sultry days, was unusually favourable to the spread of rust, and by August 15 many fields were badly discoloured from this cause. Where the injury was only slight, the colour of the straw was dull red, and the grain only slightly shrunken, but in the fields seriously injured, both heads and straw were of a dark brown colour readily distinguishable at a distance, and the kernel badly shrunken.

The badly injured fields were sometimes scattered among others comparatively free of rust, and often there was no apparent reason for the difference, but excessive growth of straw from any cause appears to encourage the disease. This was particularly noticeable on rank summer-fallow and land heavily manured for root crops.

Many fields lying under the shelter of belts or bluffs of timber were noticed to be badly affected, possibly for want of a free circulation of air; sheltered hollows also suffered badly, especially if the soil was rich in humus.

On this farm most of the uniform test plots were on sheltered land which had been ploughed early and well summer-fallowed, for this reason the growth of straw was very rank and the injury from rust much greater than on the larger fields more exposed and not so carefully summer-fallowed.

In the accompanying tables it will be noticed that some varieties are more subject to injury from this cause than others, all velvet headed kinds such as Hayne's Blue Stem were severely injured, while the Macaroni Wheats are comparatively uninjured, the yield large and kernel plump and heavy.

It will be noticed that a number of the cross-bred varieties are several days earlier than Red Fife, and in districts where there is danger of Red Fife being injured by fall frosts, I would strongly recommend a trial of one of these early ripening kinds. Early Riga is the earliest of all the varieties tested here, but it has not proved as productive as some of the others.

Preston Wheat although not as early as Riga, is more productive, and is usually several days earlier than Red Fife, the area sown to this wheat is increasing each year, especially in districts subject to autumn frosts. At present the millers here are paying the same price for Preston Wheat as they are for Red Fife.

Thirty-six varieties of spring wheat were tested this year, irrespective of Macaroni Wheat and Spelt. All were sown on May 4 on clay loam soil, summer-fallowed, in plots of one-twentieth acre. All the seed was treated with bluestone and the varieties were all free of smut.

SPRING WHEAT—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Rusted.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs	
Australian No. 9	Sept. 6	125	53	Fair	4	Beardless	6,550	36	40	59¼	Slightly.
Red Fife	" 7	126	53	Stiff	3½	"	6,700	36	40	58½	Considerably.
Crawford	" 1	120	41	"	3	"	5,840	36		60½	Slightly.
Australian No. 19	" 8	127	50	"	3½	"	6,840	36		59½	Considerably.
Power's Fife (Minn. 149)	" 8	127	51	Weak	4	"	6,800	35		59	Slightly.
Chester	Aug. 6	125	52	Stiff	4	"	6,260	34		59½	Badly.
Monarch	Sept. 8	127	51	Fair	3½	"	6,880	33	40	58¾	Considerably.
Preston	" 4	123	53	Stiff	3½	Bearded	6,420	33		56	"
Benton	" 1	119	47	"	4	Beardless	5,520	31	20	58	Badly.
Huron	Aug. 29	117	52	Fair	3½	Bearded	6,520	31	20	56¼	Considerably.
Pringle's Champlain	Sept. 2	121	50	"	3½	"	6,120	31	20	58	"
White Fife	" 7	126	53	Stiff	3	Beardless	5,600	31	20	57½	"
Fraser	Aug. 27	115	41	"	3	Bearded	6 140	31		58¾	"
Advance	Sept. 1	120	51	"	3	"	5,840	31		57¼	Badly.
Admiral	" 6	125	53	"	3½	Beardless	6,420	29	40	56½	Considerably.
Hungarian	" 1	120	47	"	3	Bearded	5,940	29	20	57¼	Badly.
Dawn	" 4	123	51	"	3	Beardless	6,160	29		56¾	Considerably.
Early Riga	Aug. 24	112	43	Stiff	3	"	5,420	28		58½	"
Byron	" 29	117	50	"	3½	Bearded	5,380	27	40	57	"
Hastings	Sept. 4	123	49	"	3	Beardless	4,880	27		58¾	Badly.
Hayne's Blue Stem (Minn. 169)	" 5	124	50	Weak	4	"	7,380	27		55¼	"
White Russian	" 2	121	47	"	4	"	7,200	26	40	58½	"
Weldon	" 4	123	53	Stiff	3½	"	7,120	26	20	57	"
Wellman's Fife	" 5	124	53	"	4	"	7,520	26	20	55½	Considerably.
Stanley	" 1	120	51	Fair	4	"	7,160	26	20	56	"
Percy	Aug. 31	119	50	Stiff	4	"	6,420	26	20	55½	"
Clyde	" 31	120	50	"	5	"	6,140	26		54¼	"
Minnesota No. 163	Sept. 4	123	52	Weak	4	"	6,560	25	40	56¼	Badly.
Laurel	" 4	123	53	Stiff	4	"	6,180	25	20	56	Considerably.
Countess	" 1	120	50	Fair	3	"	5,580	25	20	56	Badly.
Red Fern	" 1	120	51	Stiff	3½	Bearded	6,700	23	20	54½	Considerably.
Plumper	" 3	122	49	"	3	"	6,800	23	20	56¾	"
Herisson Bearded	Aug. 29	117	46	Weak	2	"	5,860	22	20	55½	Badly.
Colorado	Sept. 2	121	51	Fair	3½	"	6,080	22		54	Considerably.
Rio Grande	" 6	125	50	"	3½	"	6,920	19	40	52½	"
McKendry's Fife	" 2	121	52	"	4½	Beardless	6,520	16	20	57	Badly.

MACARONI WHEAT.

This class of wheat has proved almost free of rust, and for that reason it has during the past few years been much more productive than other varieties.

As this kind of wheat is unsaleable for milling purposes in this country, we do not recommend it for general cultivation.

The size of the plots used for this test was one-twentieth acre. The soil a clay loam, summer-fallowed. All were sown on May 4.

MACARONI WHEAT—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Proportion Rusted.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs	
Goose	Sept. 10	129	52	Fair	2½	Bearded	6,700	53	20	60	Slightly.
Roumanian	" 12	131	53	"	2½	"	6,180	45	20	61	Considerably.
Yellow Gharnovka	" 9	128	53	Weak	3	"	6,660	45	..	62¾	Slightly.
Mahmoudi	" 9	128	45	Fair	3½	"	5,320	44	40	61	"

EMMER AND SPELT.

In addition to the Common Emmer, incorrectly called Speltz in this country, a test has been made with one other Emmer and two kinds of Spelt.

The Common Emmer is not only the most productive but the weight per bushel is decidedly greater.

The Common Emmer has suffered during the past two seasons from the heads breaking from the straw just before harvest. For this reason, it may be better to harvest it before it is fully ripe.

The size of the plots used for this test was one-twentieth acre. The soil a clay loam, summer-fallowed. All were sown on May 4.

EMMER AND SPELT—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.	Proportion Rusted.
			In.		In.		Lbs.	Lbs.	
Common Emmer	Sept. 9.	128	44	Weak	2½	Bearded.	6,260	4,140	Slightly.
Red Emmer	" 9.	133	56	Stiff	2½	"	6,720	2,780	"
Red Spelt	" 9.	131	48	"	4½	Beardless.	5,800	2,000	"
White Spelt	" 9.	129	46	"	4½	"	5,060	1,240	"

FIELD PLOTS OF WHEAT.

Owing to the Assiniboine river overflowing its banks, we were unable to sow as many large grain fields as usual and in some cases where fields had been sown the water partly destroyed the crop, making accurate returns impossible

Variety.	Rust.	Character of Soil.	Size of Field.	Date of Sowing.	Date of Ripening.	Weight per Bushel.	Yield per Acre.	
						Lbs.	Bush.	Lbs.
Preston	Little	Clay loam	6 acres.	May 2	Aug. 23	60	30	..
Laurel	None.	Sandy "	5 "	April 28	" 17	59½	24	36
White Fife	"	" "	2 "	" 29	" 22	60	22	..
Red "	"	" "	4 "	May 2	" 22	59½	29	43
Huron	"	" "	1 "	April 29	" 17	60	31	..
Pringle's Champlain	"	" "	1 "	" 29	" 17	60	25	..

VARIETIES OF WHEAT GROWN FROM SELECTED AND UNSELECTED SEED.

As in former years, the largest heads were selected from standing grain of last year, and the seed was sown this year for comparison with unselected seed from the same plots.

The accompanying table gives the result of each individual variety. A summary is also given which shows the average yield from the selected wheat to be fifty-four pounds more than the unselected. All were sown on summer-fallow land. The soil was a clay loam.

WHEAT.

Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	Yield per Acre.		Weight per Bushel.
				Bush.	Lbs.	Lbs.
Countess, unselected	$\frac{1}{20}$ acre	May 4	Sept. 1	25	20	54½
" selected	$\frac{1}{20}$ "	" 4	" 1	24	20	54½
Stanley, unselected	$\frac{1}{20}$ "	" 4	" 1	26	20	54
" selected	$\frac{1}{20}$ "	" 4	" 1	29	..	54
Byron, unselected	$\frac{1}{20}$ "	" 4	Aug. 29	27	40	55
" selected	$\frac{1}{20}$ "	" 4	" 29	28	40	55

Average yield of 3 varieties (selected) 27 bush. 20 lbs.
" (unselected) 26 bush. 26 lbs.

CUTTING RUSTY WHEAT AT DIFFERENT STAGES.

Farmers found it somewhat difficult to decide on the most suitable time to cut fields of rusty grain. It was thought by many, that early cutting would arrest the rust, and allow the kernel to fill out in the stook. Others allowed the grain to fully mature before harvesting. For the purpose of gaining some information on this point, four plots of wheat were cut at intervals of one week and a record kept of the returns from each.

From the accompanying table it will be seen that the plot cut in the dough or late milk stage, gave the best results. This experiment should, however, be repeated before definite opinions are reached.

No.	Variety.	When Sown.	When Harvested.	Stage of Straw when Harvested.	Stage of Grain when Harvested	Yield per Acre.		Weight per Bushel.
						Bush.	Lbs.	Lbs.
1	Red Fife	May 18	Aug. 30	Quite green	In the milk	25	40	54
2	"	" 18	Sept. 6	Greenish	In the dough	26	..	54
3	"	" 18	" 13	Nearly ripe	Nearly hard	24	40	54
4	"	" 18	" 22	Quite ripe	Quite hard	24	20	54

EXPERIMENTS WITH THE USE OF BARN-YARD MANURE ON WHEAT.

The plots used for this test in 1903 were again sown with wheat this year. Five adjoining plots in fallow last year were also sown at the same time.

The series of plots selected for this purpose were laid out on the upper portion of the farm where the soil is quite light and somewhat exhausted.

The size of the plots was one-twentieth acre, and the soil a very light sandy loam. The previous crop was wheat. The variety sown was Red Fife, sown on May 13 and harvested from August 26 to September 1.

No. Plot.	Treatment in 1903.	Yield in 1903.		Yield in 1904.	
		Bush.	Lbs.	Bush.	Lbs.
1	10 loads per acre, rotted manure	13	30	18	40
2	No manure	16	10	19	..
3	10 loads fresh manure	18	..	24	..
4	Summer-fallowed in 1903	None.		23	20
5	Clover ploughed in	"		20	..
6	Peas ploughed in	"		21	20
7	10 loads rotted manure	"		24	40
8	10 " fresh "	"		25	40

SUMMARY.

1. The plots left without a crop in 1903 gave the largest average yields of grain this year.

2. The two plots treated with fresh manure gave larger returns than the two treated with rotted manure.

3. Peas used as a green manure gave better results than did clover for that purpose.

A TEST OF FERTILIZERS ON WHEAT.

With one exception the fertilized plots have this year given the largest returns. The same result was obtained with this experiment in 1902.

The size of the plots was one-fortieth acre. The soil a sandy loam, summer-fallowed. All were sown on May 18 and all harvested September 9. There was no smut, but considerable rust on all the plots. The variety of wheat sown on all the plots was Red Fife.

Plot.	——	Length of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.	Weight per Bushel.
		Inches.	Inches.	Lbs.	Bush. Lbs.	Lbs.
1	100 lbs. per acre of nitrate of soda, half sprinkled when the grain was 2 in. high, balance when 6 in. high	45	3	4,720	31 20	56
2	200 lbs. per acre of nitrate of soda, half sprinkled when the grain was 2 in. high, balance when 6 in. high	"	"	4,400	30 00	55
3	No fertilizer used	"	"	4,960	30 40	55
4	Superphosphate, 400 lbs. per acre, spread just before sowing	"	"	5,800	33 20	56½
5	Muriate of potash, 200 lbs. per acre, spread just before sowing	"	"	4,720	34 40	57
6	A mixture, 200 lbs. superphosphate, 100 lbs. nitrate of soda, 100 lbs. muriate potash, per acre, half spread before sowing, half when grain was 2 or 3 inches high	"	"	4,080	35 20	58

PREVENTIVES OF SMUT IN WHEAT.

Bluestone and formalin were both used in the tests this year.

The plots were one-twentieth acre each, and the soil a very light sandy loam. The wheat was harvested from August 26 to September 1.

Variety.	How Treated.	Good heads on 9 sq. ft.	Smut heads.
Red Fife.	Sprinkled with 9 oz. of formalin to 10 galls. water	379	
"	" " 1 lb. of bluestone to 1 pail "	389	
"	Not treated	430	25.

DEEP AND SHALLOW SOWING.

Two one-twentieth acre plots of Red Fife were sown on May 18, with a shoe drill. In one case the seed was sown 2 inches deep and the other 3½ inches. As each produced at the rate of 31⅔ bushels per acre the depth of sowing made no appreciable difference in the yield.

OATS.

Early sown oats in this part of Manitoba were generally a good crop, and on the experimental farm the uniform plots gave the best returns ever obtained here.

The land used for this purpose was sown with pease in May, 1903. These were ploughed down when in blossom, and the land cultivated on the surface for the balance of the season. This spring the land was harrowed and the oats sown at once. The growth was very rapid, but the straw remained stiff all summer, and there was no lodged grain at any time.

Many complaints are received each year of serious losses from rust in oats and requests for a remedy are numerous; while none of the varieties of oats tested on this farm are entirely free from rust, Banner is as little affected as any of them. As a preventive for rust, early sowing should be practiced. In every instance where late sowing has been done on this farm, rust has considerably injured a large proportion of the crop, while early sown oats on adjoining fields seldom, if ever, suffer much from this cause.

Four plots of oats were seriously injured by blackbirds. The plots were near water, and in spite of the free use of a gun, the birds destroyed a large proportion of the crop.

The test was made with forty-two varieties, on plots of one-twentieth acre each. The soil was a clay loam, the previous crop, pease, ploughed down, two bushels of seed per acre was used. All were sown on May 5.

OATS—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Rusted.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs	
Improved American	Aug. 26	113	49	Stiff..	11	Branching	5280	134	4	36½	Slightly.
Golden Beauty	" 26	113	48	"	8	"	4920	132	32	36	Considerably.
Danish Island	" 26	113	41	"	9	"	5040	132	12	36½	"
Banner	" 27	114	47	"	9	"	5080	131	6	37½	Slightly.
Abundance	" 26	113	46	"	9	"	4560	130	20	35	"
Lincoln	" 26	113	47	"	8	"	5200	127	22	36½	Considerably.
Siberian	" 26	113	43	"	8	"	5520	127	22	35	"
Early Golden Prolific	" 23	110	50	"	9	"	4820	127	2	36	Slightly.
Wide Awake	" 27	114	48	"	8	"	5360	125	30	37½	"
American Triumph	" 26	113	48	"	9	"	4880	125	10	36½	None.
Waverley	" 26	113	43	"	9	"	5260	122	32	36½	Slightly.
Buckbee's Illinois	" 27	114	45	"	9	"	4900	121	26	36½	"
White Giant	" 24	111	49	"	9	"	5800	121	26	35½	Considerably.
Golden Fleece	" 26	113	47	"	11	"	5060	120	..	34	"
Scotch Potato	" 27	114	49	"	10	"	5880	119	14	36	Slightly.
Columbus	" 23	110	45	"	8	"	4640	117	22	35½	"
Thousand Dollar	" 22	109	46	"	9	"	5140	117	22	37½	None.
American Beauty	" 23	110	48	"	9	"	5140	117	22	34	Slightly.
Golden Giant	" 31	118	41	"	11	Sided	5780	116	16	35	Considerably.
Olive White	" 29	116	48	"	9	"	5580	116	16	36¼	Slightly.
Bavarian	" 23	110	44	"	9	Branching	4900	115	30	37½	Considerably.
Golden Tartarian	" 30	117	43	"	12	Sided	5780	113	18	34½	Slightly.
Irish Victor	" 23	110	43	"	9	Branching	5400	112	32	33½	Considerably.
Goldfinder	" 30	117	42	"	10	½ Sided	4840	111	26	34	"
Kendal White	" 25	112	46	"	10	Sided	5460	108	8	38¾	Slightly.
Black Beauty	" 24	111	43	Weak	9	Branching	5260	108	8	37	Considerably.
Joanette	" 30	117	44	"	8	"	5580	107	22	37	"
Twentieth Century	" 20	107	48	Stiff..	9	"	4380	107	22	37½	None.
Pioneer	" 26	113	49	"	8	"	4900	107	2	38½	Considerably.
Tartar King	" 26	107	46	"	8	Sided	4440	105	30	40	"
Pense Black	" 30	117	51	"	9	"	5960	105	30	38	"
Milford White	" 28	115	47	"	10	"	5260	105	10	38½	"
Kendal Black	" 30	117	50	"	10	"	5980	104	24	38	Slightly.
Milford Black	" 29	116	42	"	9	"	5420	103	18	37½	"
Olive Black	" 29	116	49	"	10	Branching	5920	103	18	37½	"
Pense White	" 28	115	49	"	9	Sided	5900	101	6	38¾	"
*Holstein Prolific	" 17	105	44	"	9	Branching	5120	100	20	34	Considerably.
Storm King	" 26	113	47	"	9	Sided	4680	90	..	37	Slightly.
*Mennonite	" 17	105	44	"	9	Branching	5080	90	..	26	Considerably.
*Sensation	" 23	110	46	"	9	"	5440	79	14	33	"
*Improved Ligowo	" 17	105	48	"	9	"	6360	58	8	31	Badly.
*Swedish Select	" 17	105	47	"	8	"	6460	54	4	29½	"

*Injured by Blackbirds.

FIELD PLOTS OF OATS.

The remarks given under the head of field plots of wheat apply to oats also, only two fields of this grain were left uninjured by the flood.

One field of Banner oats, 11 acres in extent, soil a clay loam, summer-fallowed, was sown on May 13 and cut on August 23. It gave a return of 73 bushels and 27 lbs. per acre, weighing 37 lbs. per bushel. There was very little rust and no smut in this field.

A field of American Beauty oats, 5 acres in extent, soil a clay loam, summer-fallowed, was sown on May 13 and cut on September 1. It gave a return of 81 bushels and 2 lbs. per acre, weighing 38 lbs. per bushel. There was very little rust and no smut in this field.

BARLEY.

This grain has given excellent returns and a heavy kernel. Among the six-rowed varieties I wish to call attention to Yale barley, a hybrid between Duckbill and Rennie's Improved, this variety stands second on the list of the most productive kinds tested here during the past five years, and it has also given excellent returns on nearly all the experimental farms.

We find that barley can be used to a good advantage as a cleaning crop, weedy land cultivated near the surface in early spring, then ploughed deep about May 20 and sown at once with six-rowed barley will generally give large returns, and also leave the land much cleaner of weeds.

Many inquiries are made regarding beardless varieties of barley. Champion and other varieties of this class have been under trial on this farm for many years, but the yield from them has generally been much below that of the bearded kinds, and the weight per bushel is invariably under the standard.

While all varieties of barley stood up well this year, we usually find the six-rowed varieties have the best straw. The two-rowed Thorpe kinds come next, while the Chevalier varieties are usually too weak for summer-fallow land in this climate.

Twenty varieties of six-rowed barley were tested. Size of plots one-twentieth acre. The soil was sandy loam, which had been summer-fallowed. All were sown on May 17 in the proportion of two bushels of seed per acre. There was no rust on any of the varieties.

BARLEY—SIX-ROWED—TEST OF VARIETIES.

Name of Variety.	Date of Ripening	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
			In.		In.	Lbs.	Bush.	Lbs.	Lbs
Brome	Aug. 18	93	34	Fair	3	3,900	66	32	52½
Yale	" 18	93	38	Stiff	3	3,600	62	24	51¼
Empire	" 18	93	38	"	3½	3,480	58	36	52½
Odessa	" 18	93	36	"	3⅜	2,440	57	24	52
Claude	" 18	93	35	"	2¾	3,120	55	40	49½
Argyle	" 16	91	37	"	3	2,380	54	28	51
Trooper	" 18	93	34	"	3	3,780	54	28	52¼
Stella	" 16	91	33	"	3	3,600	53	16	52
Baxter	" 14	89	38	"	2½	2,740	53	16	53
Summit	" 18	93	34	"	3	2,980	52	44	52¼
Mansfield	" 18	93	37	"	3½	3,140	52	24	52
Garfield	" 17	87	34	"	3	2,980	52	24	52
Nugent	" 18	93	32	"	3	2,700	47	24	52
Mensury	" 14	89	37	"	3½	3,040	47	04	50½
Albert	" 13	88	37	"	3	3,560	46	32	53
Royal	" 14	89	34	"	3	2,780	46	12	50½
Rennie's Improved	" 14	89	36	"	3½	2,720	43	16	52½
Common	" 13	88	33	"	3	2,340	42	44	52
Oderbruch	" 14	89	27	"	3	1,900	41	32	53½
Champion	" 10	85	33	"	3	2,120	21	32	46¾

Fifteen sorts of two-rowed barley were tested this season. The soil was a sandy loam, which had been summer-fallowed. All were sown on one-twentieth acre plots, on June 6, in the proportion of two bushels of seed per acre.

BARLEY—TWO-ROWED—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Rusted.
			In.		In.	Lbs.	Bush.	Lbs.	Lbs	
Invincible	Sept. 7	85	45	Stiff.	5	4,380	63	36	50¾	Considerably.
Gordon	" 8	83	44	"	3	5,380	63	36	51½	Slightly.
Standwell	" 10	85	39	"	4	5,580	63	36	51¼	"
Fulton	" 7	82	40	"	3	5,140	59	28	51	"
Clifford	" 8	83	43	"	3½	5,180	58	36	52	"
Dunham	" 9	84	38	"	3	5,180	56	32	51	"
Sidney	" 7	82	38	"	4	3,720	55	40	50½	None.
Jarvis	" 7	82	44	"	4½	4,920	55	40	51½	Slightly.
Harvey	" 11	86	40	"	3½	3,620	55	40	51½	"
Canadian Thorpe	" 12	87	38	"	3	6,540	55	20	51¾	"
Danish Chevalier	" 12	87	34	"	4	4,720	53	36	50	"
Logan	" 12	87	40	"	4	5,080	52	24	51¼	"
Beaver	" 12	87	35	"	3½	5,580	52	24	52	Considerably.
French Chevalier	" 12	87	36	"	4	5,240	42	44	51	"
Newton	" 10	85	34	"	4	5,740	30	20	49½	Slightly.

EXPERIMENTS WITH FLAX.

Ten varieties of flax were under trial on the experimental farm. The crop was uniformly good and attracted much attention, particularly from the United States visitors, who are much interested in flax growing.

The St. Petersburg, Russian, Improved Russian, and Common are very similar in appearance. The La Plata has a decidedly spreading habit and branches much nearer the ground than the others. It is also about a week later.

The La Plata and Novarossick again head the list for productiveness, evidently they are very desirable kinds for this country.

These plots were all one-fortieth acre each.

FLAX—TEST OF VARIETIES.

Varieties.	Date of Sowing.	Date of Ripening.	Length of Straw.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
			Inches.	Lbs.	Bush.	Lbs.	Lbs.
La Plata	May 19..	Aug. 26..	20	1,480	23	32	55½
Novarossick	" 19..	" 20..	23	1,760	22	8	55
Russian	" 19..	" 21..	25	1,640	20	40	55½
Riga	" 19..	" 23..	33	1,560	18	32	56
Yellow Seeded	" 20..	" 19..	27	1,560	18	32	55
White Flowering	" 19.	" 20..	27	1,600	17	48	56
Bombay	" 19..	" 26..	18	1,200	17	48	56
Improved Russian	" 20..	" 23..	34	1,720	15	40	56
St. Petersburg	" 19..	" 23..	28	1,760	11	24	56
Common	" 20..	" 23..	33	1,040	10	..	56

SOWING FLAX ON NEW BREAKING.

Many inquiries are received from new settlers regarding the advisability of sowing flax on new breaking. I have always recommended that new breaking be left unsown the first year, for the following reasons:—

1st. The yield of grain of any kind is comparatively small from breaking and the time can be more profitably used in breaking additional land.

2nd. It is almost impossible to procure flax seed free from foul weed seeds. We have found seven distinct varieties of wild mustard in one lot of flax procured for this farm.

3rd. For some unexplained reason, land sown with flax the first year fails to give full returns for several years afterwards.

Last year two plots of new prairie land were broken in May, one of the plots was sown with Common Flax as soon as broken and harrowed, the other was left unsown, but was ploughed a second time (backsett) in July. The plot sown with flax gave a yield of 8 bushels and 12 pounds per acre.

This year both were again ploughed and sown with Red Fife Wheat, with the following result:—

—	Date of Sowing.	Date of Ripening.	Weight of Straw.	Yield per Acre.	
			Lbs.	Bush.	Lbs.
Red Fife on backsetting	May 12..	Sept. 5 .	4,200	33	20
" after flax crop	" 12..	" 5..	3,320	24	40

From the accompanying table it will be noticed that the plot left without a crop gave $8\frac{2}{3}$ bushels per acre more wheat than the land sown with flax.

FLAX STUBBLE FOR GRAIN CROP.

On old land a grain crop following flax has usually given fair returns here. This is probably owing to the small amount of stubble left by a flax crop, permitting of a compact seed bed so necessary for the wheat plant.

DIFFERENT PREPARATIONS FOR A WHEAT CROP.

All on plots of 1-20 acre each.

Preparation.	Rusted.	Date of Sowing.	Date of Ripening.	Weight of Straw.	Yield per Acre.	
				lbs. per ac.	Bush.	Lbs.
Wheat after flax	Considerably..	May 11..	Sept. 3..	5680	43	40
" wheat	" ..	" 11..	" 3..	4880	37	..
" oats	" ..	" 11..	" 3..	4900	36	40
" barley	" ..	" 11..	" 3..	4080	33	40
" millet	" ..	" 11..	" 3..	3280	35	20
Wheat on summer-fallow	Badly	" 11..	" 4..	4540	32	46

DIFFERENT GRAIN CROPS FOLLOWING FLAX.

—	Date of Sowing.	Date of Ripening.	Weight of Straw.	Yield per Acre.	
			Lbs.	Bush.	Lbs.
Wheat (Red Fife) after flax	May 11..	Sept. 3..	5680	43	40
Oats (Banner) after flax	" 11..	Aug. 26..	4620	68	8
Barley (Mensury) after flax	" 11..	" 22..	3060	52	44
Pease (Mummy) "	" 11..	Sept. 2..	.....	53	20

EXPERIMENTS WITH PEASE.

Thirty-one varieties of pease were on trial this year. The yield has been very much above the average and the sample excellent.

This grain is nearly always very productive here, the only obstacle to its more general cultivation is the difficulty in harvesting and threshing it.

The pea weevil is unknown, the sample is usually good and the weight per bushel high.

The soil selected this year was a sandy loam summer-fallowed, the size of the plots one-twentieth acre. All were sown on May 11, in the proportion of two bushels of seed per acre for the small kinds and three bushels for the larger ones.

PEASE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.		Weight per Bushel.
					In.	In.		Bus.	Lbs.	Lbs.
1	Mackay	Sept. 11	123	Rank	42	2½	Medium	85	..	63½
2	Macoun	" 12	124	"	37	2½	Small	79	40	64½
3	Picton	" 12	124	"	36	2½	Large	77	10	63½
4	Arthur	" 2	114	Medium	34	2½	Medium	77	.	65
5	King	" 8	120	Rank	42	2	"	75	..	65
6	Carleton	" 10	122	Medium	37	2¼	Small	73	50	64¼
7	Paragon	" 10	122	Rank	38	2½	Medium	73	20	62½
8	Pearl	" 20	133	"	46	3	"	73	20	62
9	Mummy	" 19	132	"	53	2	"	73	..	64
10	Victoria	" 20	133	"	44	3½	Large	71	40	64
11	Early Britain	" 5	117	"	43	2¼	"	71	..	61¾
12	Gregory	" 9	121	Medium	54	2½	Medium	70	..	65½
13	White Marrowfat	" 20	133	Rank	63	3	Large	68	20	64
14	Daniel O'Rourke	" 16	129	"	46	2½	Small	67	..	65½
15	Golden Vine	" 5	117	Fair	48	2	"	66	20	63¾
16	Pride	" 20	133	Rank	54	2	Medium	64	20	64¼
17	Archer	" 18	131	"	43	2	"	64	..	64¼
18	Prince	" 18	131	"	44	2½	"	63	20	64
19	Kent	" 18	131	"	44	3	Large	61	20	64½
20	Prince Albert	" 15	128	Fair	63	2½	Small	60	40	63½
21	English Grey	" 18	131	"	42	3	Medium	60	..	61¾
22	Duke	" 20	133	Rank	42	2	"	58	..	63
23	Prussian Blue	" 1	113	Fair	43	2¼	"	58	..	65¼
24	Nelson	" 10	122	"	33	2½	"	57	40	64¾
25	Crown	Aug. 25	106	Weak	37	2	Small	57	20	65½
26	Wisconsin Blue	Sept. 10	122	"	38	2	"	57	20	66
27	Agnes	" 6	118	Fair	42	2¼	Medium	56	..	63½
28	White Wonder	Aug. 30	111	Weak	34	2	Small	55	40	66
29	Black-eyed Marrowfat	Sept. 1	113	Rank	41	3½	Large	52	..	63½
30	Chancellor	Aug. 25	106	Weak	32	2	Small	51	20	65½
31	German White	Sept. 5	117	Medium	36	2½	Large	50	20	65

EXPERIMENTS WITH INDIAN CORN.

The crop of Indian Corn was slightly above the average this year, but it was scarcely as far advanced as usual when harvested.

In addition to the uniform test of plots of corn, about eight acres were sown for feeding purposes, 38 tons of this was used for ensilage, and the balance cured in stooks, and will be fed during the winter months. We find that all classes of stock relish dry corn fodder, even horses are benefited by one meal of it a day during the slack months of winter.

The seed was sown on May 26, in rows 30 inches apart, using about half a bushel of seed per acre. The crop was cut on September 23. Twenty varieties were under trial. The soil was a rather light sandy loam and the previous crop was corn. The yields were calculated from two rows, each 66 feet long.

INDIAN CORN—TEST OF VARIETIES.

Number.	Name of Variety.	Height.	Leafiness.	When Tasselled.	In Silk.	Early Milk.	Late Milk.	Condition when Cut.	Weight per Acre grown in rows.		Weight per Acre grown in hills.	
		In.							Tons.	Lbs.	Tons.	Lbs.
1	Giant Prolific Ensilage	87	Very leafy	Aug. 29				In tassel	25	160	26	272
2	White Cap Yell'w Dent	87	Fairly leafy.	" 29				"	24	840	24	48
3	Thoroughbred White Flint	76	Very leafy	" 29				"	24	840	22	1,672
4	Red Cob Ensilage	90	Fairly leafy.	Sept. 1				"	23	240	21	1,560
5	Superior Fodder	74	Very leafy	" 5				"	22	1,408	22	352
6	Champion White Pearl	97	Few leaves	Aug. 27				"	21	768	19	808
7	Salzer's All Gold	87	Very leafy	" 30				"	21	240	23	1,520
8	King Philip	85	"	" 18	Aug. 23	Aug. 31	Sept. 6	L. milk.	20	920	18	960
9	Mammoth Cuban	75	Few leaves	" 26	Sept. 1			In silk.	19	1,600	19	808
10	Cloud's Early Yellow.	86	"	" 29				In tassel	18	960	17	848
11	Longfellow	84	Fairly leafy.	" 17	Aug. 27	Sept. 16		E. milk.	18	432	18	1,488
12	Pride of the North	74	Very leafy	Sept. 1				In tassel	17	1,640	16	1,000
13	North Dakota White.	76	"	Aug. 18	Aug. 23	Sept. 1	Sept. 6	L. milk.	17	1,640	19	1,600
14	Angel of Midnight	93	Leafy	" 19	" 30	" 5		E. milk.	17	1,112	17	1,376
15	Compton's Early	79	Fairly leafy.	" 18	" 26	" 1		"	16	1,792	18	960
16	Early Mastodon	84	Leafy	" 29	Sept. 5			In silk.	16	1,000	17	1,640
17	Early Butler	104	Quite leafy	Sept. 1				In tassel	16	1,000	19	280
18	Eureka	76	Few leaves	Aug. 30				"	15	360	18	960
19	Selected Leaming	81	"	Sept. 1				"	13	664	10	64
20	Evergreen Sugar	73	Leafy	Aug. 28				"	11	440	11	1,760

INDIAN CORN—SOWN AT DIFFERENT DISTANCES APART.

Name of Variety.	Distance apart.	Height.	Condition when Cut.	Weight per Acre, cut green for ensilage.	
	Inches.	Inches.		Tons.	Lbs.
Longfellow, 4 rows	24	85	Early milk.	26	800
" 4 "	30	85	"	22	880
" 4 "	36	85	"	19	1,600
" 4 "	42	85	"	17	1,252
Selected Leaming	24	81	In tassel	16	1,000
"	30	81	"	15	1,680
"	36	81	"	14	600
"	42	81	"	17	1,438
Champion White Pearl	24	97	"	20	1,250
" "	30	97	"	19	1,072
" "	36	97	"	16	1,880
" "	42	97	"	15	160

INDIAN CORN.

Average Yield at Different Distances Apart.	Tons.	Lbs.
Average yield of green corn 24 inches apart	21	350
" " 30 "	19	544
" " 36 "	17	26
" " 42 "	16	1,616

FIELD ROOTS.

The yield of all kinds of field roots has been unusually good on the experimental farm this year, and a few notes on our manner of growing them may prove useful to new settlers in this country.

For the best results soil intended for field roots should be rich, moist, and fairly free of weed seeds. These conditions can be obtained by sowing on manured summer-fallow land, or by using the same land continuously for a root crop, but alternating the kind of root from year to year; for instance, land in potatoes this year could be sown to turnips next season. The latter plan has been adopted here, and about ten loads of manure per acre is applied every second or third year. If all root tops and other rubbish is ploughed under deeply, just as soon as the crop is off, and the land rolled, there will be no trouble from cutworms.

All manure should be applied in the autumn. Only well rotted manure should be used, and it must be broken up fine for the best results.

All field roots should be sown much earlier than is generally practiced. Carrots can be sown May 1, turnips May 10, and mangels and sugar beets May 15.

Ridged drills dry out quickly, for that reason only level drills should be used.

TURNIPS.

Twenty varieties of turnips have been on trial at the experimental farm this year. The yield was the largest for years, and the quality good.

The soil was a sandy loam, manured in 1902, and the previous crop was potatoes.

As usual two sowings were made of each variety; in every instance the early sown plots gave the largest returns.

The first plots were sown on May 10, the second on May 23, and the roots from both were pulled on October 6. The estimate of yield has been made from the produce of two rows, each 66 feet long.

TURNIPS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre. — 1st Plot.		Yield per Acre. — 1st Plot.		Yield per Acre. — 2nd Plot.		Yield per Acre. — 2nd Plot	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Good Luck	43	1,120	1,452	..	23	1,520	792	.
2	Jumbo	37	1,240	1,254	..	25	1,480	858	..
3	Magnum Bonum	34	640	1,144	..	25	1,480	858	..
4	Hall's Westbury	31	304	1,038	24	23	200	770	..
5	Bangholm, selected	30	720	1,012	..	22	880	748	..
6	East Lothian	29	1,400	990	..	21	768	712	48
7	Perfection Swede	29	1,136	985	36	21	1,560	726	..
8	Kangaroo	29	80	968	..	19	1,600	660	..
9	Hartley's Bronze	29	80	968	..	21	240	704	..
10	New Century	28	1,552	959	32	23	1,520	792	..
11	Selected Purple Top	28	760	946	..	22	616	743	36
12	Imperial Swede	28	760	946	..	23	200	770	..
13	Drummond Purple Top	28	760	946	..	21	1,560	726	..
14	Carter's Elephant	28	760	946	..	21	768	712	48
15	Emperor Swede	27	1,176	919	36	19	1,600	660	..
16	Sutton's Champion	26	1,592	893	12	21	768	712	48
17	Mammoth Clyde	26	1,328	888	48	23	1,520	792	..
18	Halewood's Bronze Top	26	1,328	888	48	19	280	638	..
19	Elephant's Master	26	800	880	..	19	1,600	660	..
20	Skirvings	26	800	880	..	22	880	748	..

EXPERIMENTS WITH MANGELS.

Sixteen varieties of mangels have been on trial at the experimental farm this year. The yield was excellent and the roots were saved free of injury from frost.

The soil used for this crop was a black loam fertilized in 1902, with ten loads of well-rotted stable manure, applied in the autumn. The previous crop was potatoes. The first sowing was made on May 7, and the second on May 21. All were harvested on September 24.

The estimate of yield has been made from the product of two rows each 66 feet long.

MANGELS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Mam. Yellow Intermediate	39	1,992	1,333	12	31	568	1,042	48
2	Gate Post	37	712	1,245	12	29	872	981	12
3	Half Long Sugar White	35	1,544	1,192	24	31	40	1,034	..
4	Yellow Intermediate	31	1,624	1,060	24	38	32	1,267	12
5	Prize Winner Yellow Globe	31	1,360	1,056	..	30	1,512	1,025	12
6	Mammoth Long Red	31	1,096	1,051	36	27	120	902	..
7	Triumph Yellow Globe	31	568	1,042	48	28	760	946	..
8	Selected Mammoth Long Red	31	304	1,038	24	29	1,928	998	48
9	Leviathan Long Red	31	40	1,034	..	28	496	941	36
10	Giant Yellow Intermediate	31	40	1,034	..	31	304	1,038	24
11	Giant Sugar Mangel	29	80	968	..	27	648	910	48
12	Prize Mammoth Long Red	28	496	941	36	30	192	1,003	12
13	Lion Yellow Intermediate	27	648	910	48	24	1,104	818	24
14	Half Long Sugar Rosy	26	800	880	..	28	760	946	..
15	Giant Yellow Globe	25	160	836	..	35	1,280	1,188	..
16	Selected Yellow Globe	24	1,896	831	36	36	600	1,210	..

CARROTS.

Profiting by last year's experience, a deep friable soil was selected for this test. The land was ploughed deeply in the fall so as to give the root an opportunity to penetrate the soil. The previous crop was mangels.

Ten varieties were tried. The first sowing was made on May 7, the second on May 21. This year, with one exception, the first sown plots gave the largest yield.

The yield per acre has been calculated from the products of two rows, each 66 feet long.

CARROTS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
		Tons.	Lbs.	Bush	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	New White Intermediate	38	1,440	1,290	40	24	840	814	..
2	Long Yellow Stump Rooted	36	600	1,210	..	29	520	975	20
3	Ontario Champion	35	1,720	1,195	20	18	840	630	40
4	Improved Short White	33	440	1,107	20	26	1,680	894	40
5	White Belgian	33	....	1,100	..	18	840	630	40
6	Carter's Orange Giant	31	1,360	1,056	..	25	1,040	850	40
7	Mammoth White Intermediate	30	280	1,004	40	24	1,720	828	40
8	Half Long Chantenay	28	760	946	..	24	1,720	828	40
9	Giant White Vosges	26	800	880	..	15	800	513	20
10	Early Gem	22	880	748	..	23	1,080	784	40

SUGAR BEETS.

Eight varieties of these roots were on trial this year. The season was a favourable one and a large crop of well-shaped roots was harvested.

Three of the varieties were tested by Mr. F. T. Shutt, Chemist of the Dominion Experimental Farms, Ottawa, and the juice of all was found fairly rich and pure. Full particulars of this test will be found in Mr. Shutt's annual report.

The soil was a black sandy loam. The previous crop was potatoes.

The first plots were sown on May 7, the second on May 21. All were harvested on September 24.

The estimate of yield has been made from the product of two rows, each 66 feet long.

SUGAR BEETS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons	Lbs.	Bush.	Lbs.
1	Royal Giant	25	688	844	48	25	1,744	862	24
2	Red Top Sugar	24	48	800	48	25	1,480	858	.
3	Danish Red Top	23	992	783	12	23	464	774	24
4	Danish Improved	23	200	770	..	20	656	677	36
5	Wanzleben	22	880	748	..	18	1,488	624	48
6	Improved Imperial	21	504	708	24	24	240	814	..
7	French 'Very Rich'	21	240	704	..	14	1,040	484	..
8	Vilmorin's Improved	17	1,904	598	24	16	208	536	48

POTATOES.

Forty-one varieties of potatoes were on trial on this farm. The yield was larger than usual and the quality excellent. There was no injury from rot or other disease and they were free from the attacks of the Colorado beetle.

The soil selected this year was a sandy loam and the previous crop was turnips. The soil was fertilized with ten tons of well-rotted manure in the autumn of 1902.

The potatoes were planted on May 14 in rows three feet apart and dug on September 26. The yield has been estimated in each case from the product of one row 66 feet long.

It is quite evident from the experience gained on this farm during the past 15 years, that Early Rose potatoes, the kind usually grown here, are no longer as prolific as some other varieties, and I do not hesitate to advise the abandonment of that variety for others mentioned in the accompanying list. As potatoes increase rapidly, the 3-pound packages supplied free by the experimental farms will in a short time produce sufficient to supply a family. It is found that a somewhat long, pink-coloured potato, of the Early Rose type, gives the best satisfaction in this province. This class of potatoes are usually early, dry and mealy.

The following are some of the most productive varieties of this class: Maule's Thoroughbred, Canadian Beauty, General Gordon, Rose No. 9, Seedling No. 7.

POTATOES—TEST OF VARIETIES.

Number.	Name of Variety.	Character of Growth.	When Matured.	Average Size.	Total Yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour.
					Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Late Puritan	Rank	Sept. 5	Large	847	.	799	20	47	40	Long, round, white.
2	Prolific Rose	"	Aug. 25	"	656	20	616	..	40	20	Round, deep pink.
3	Dreer's Standard	"	Sept. 1	"	649	..	616	..	33	..	Flattish oval, white.
4	Money Maker	Med.	" 16	"	634	20	590	20	44	..	Round " "
5	Sabean's Elephant	Rank	" 6	Med.	605	..	561	..	44	..	Long round "
6	Maule's Thoroughbred	"	" 5	Large	568	20	553	40	14	40	" deep pink.
7	Rose No. 9	"	" 6	"	561	.	539	.	22	..	" flat, deep pink.
8	Canadian Beauty	"	" 1	"	557	20	531	40	25	40	" round, lt. pink.
9	American Giant	"	" 6	"	553	40	520	40	33	..	Round oval, white.
10	Uncle Sam	Med.	" 1	"	550	..	524	20	25	40	Flattish " "
11	Country Gentleman	Rank	Aug. 26	Med.	550	..	509	40	40	20	Long, deep pink.
12	Empire State	"	" 29	Large	546	20	506	..	40	20	" white.
13	American Wonder	"	Sept. 6	"	546	20	509	40	36	40	Long round, white.
14	State of Maine	"	" 6	"	542	40	506	..	36	40	Flat oval, white.
15	Irish Cobbler	Med.	" 1	"	539	..	487	40	51	20	Flat, white.
16	Carman No. 3	Rank	" 6	"	531	40	517	..	14	40	Long round, white.
17	Seedling No. 7	"	" 7	"	528	..	506	..	22	..	" deep red.
18	General Gordon	Med.	" 1	Med.	528	.	506	..	22	..	Long round, d'p pink.
19	Holborn Abundance	V. rank.	" 6	Large	524	20	491	20	33	..	Round, white.
20	Carman No. 1	"	" 6	"	517	..	484	..	33	.	Flat "
21	Pearce	Rank	" 1	Med.	509	40	502	20	7	20	Round, pink.
22	Cambridge Russet	"	" 1	Large	509	40	484	..	25	40	L'g round, d'p russet.
23	Enormous	"	" ..	"	495	..	451	..	44	..	Roundish, white.
24	I. X. L.	"	" 6	"	495	.	454	40	40	20	Long round, pink.
25	Delaware	"	" 5	Fair	487	40	465	40	22	..	Long oval, white.
26	Rochester Rose	Med.	Aug. 28	Med.	465	40	451	..	14	40	Long round, l't pink.
27	Swiss Snowflake	V. rank.	Sept. 6	"	462	.	429	..	33	..	Irregular, white.
28	Clay Rose	Rank	" 6	Large	458	20	429	..	29	20	Flat oval, deep pink.
29	Penn Manor	Med.	" 1	"	429	..	410	40	18	20	Long " "
30	Reeve's Rose	Rank	" 6	"	407	..	388	40	18	20	Flat " light pink.
31	Everett	Med.	Aug. 25	"	366	40	333	40	33	..	Long " pink.
32	Burnaby Seedling	Rank	Sept. 5	"	355	40	333	40	22	..	Flat " "
33	Bovee	Weak	Aug. 20	Med.	352	..	315	20	36	40	Long " light pink.
34	Early St. George	Med.	Sept. 1	Large	348	20	333	40	14	40	" " deep pink.
35	Pingree	Weak	Aug. 25	Med.	341	..	311	40	29	20	Flat " white.
36	Early Andes	"	" 24	"	330	..	300	40	29	20	Round oval, white.
37	Vick's Extra Early	V. rank.		Large	326	20	304	20	22	..	Flat, pink.
38	Rawdon Rose	Weak	Aug. 25	"	315	20	293	20	22	..	Round oval, l't pink.
39	Early Envoy	Med.	" 31	Med.	315	20	389	40	25	40	" pink.
40	Early Rose	Weak	" 25	Large	282	20	271	20	11	..	" "
41	Early White Prize				264	..	231	..	33	..	" oval, l't pink.

GRASSES.

The past season has been a fairly satisfactory one for grasses and the yield was above the average. Bald Wheat grass (*E. Virginicus*) is a native of the province. We have found it quite vigorous on light dry locations where many other grasses give poor returns. It should be cut quite green, otherwise it cures a dark brown colour and is decidedly woody in texture.

Western Rye grass (*A. tenerum*) is also a native of this province. Although a more tender grass than the Wheat grass, it also should be cut directly the head is formed, otherwise the hay is tough and hard.

On this farm we have had good results from sowing a mixture of Western Rye grass and Austrian Brome, using 7 lbs. of each variety of seed. By this plan the Brome cures better and in the mixture the slippery character of pure Rye grass is not so noticeable.

Varieties.	When sown.	Seed per acre.	Yield of Hay per acre.	
		Lbs.	Tons.	Lbs.
Austrian Brome *(Bromus inermis)*	1902	12	2	700
" "	1903	12	1	1200
Western Rye Grass *(A tenerum)*	1902	12	2	500
" "	1903	12	2	1100
Bald Wheat Grass *(Elymus virginicus)*	1902	12	1	1300
Timothy	1902	8	1	700
Red Top *(Agrostis vulgaris)*	1903	8	..	1900
Hard Fescue	1900	20	1	1800

IMPROVING PASTURE FIELDS.

Every year large areas of new land in this country are brought under cultivation, and cattle pasture becomes less plentiful, this has led many farmers to dispose of their herds, and engage exclusively in grain-growing. This is to be regretted, as mixed farming is the most desirable system of husbandry for any country.

On this farm it has been found possible to greatly increase the productiveness of a native grass pasture field, by ploughing up a portion of it each year, and seeding it down with Awnless Brome grass. If the sod is thin it can be ploughed deeply in April or May, then well disk-harrowed and sown at once with about 15 lbs. of Brome grass seed per acre, then harrowed a second time. If the land is fairly dry when seeding is done, we have not found it necessary to keep the cattle out of the field.

Where the sod is thick and tough, it is sometimes desirable to break the native sod a year in advance, and then backset it before sowing the seed. Should the Brome sod in time become too thick it may be ploughed during the summer and not harrowed or backset. This will kill a portion of the grass plants, and the remainder will become more vigorous.

The productiveness of native pasture fields can be greatly increased, if treated as above.

CLOVER.

The plots of clover have all passed another winter safely. The yield has been above the average, and the favourable weather enabled us to save the hay in good condition.

In addition to the one-twentieth acre plots of clover sown during 1902 and 1903, three one-acre fields were sown on June 1, 1904. The varieties were Alfalfa, Common Red and Alsike. The soil was a sandy loam summer-fallowed, half a bushel of barley per acre was first sown, with a drill, then 15 lbs. per acre of clover seed was sown broadcast and harrowed in. Owing to the barley being thin, the clover made a good stand of stocky plants. Just as soon as the barley had headed out it was cut for hay and removed from the land. By winter the clover had become firmly established and it promises to winter well.

Volunteer clover plants are now appearing in several parts of the farm where clover had been ploughed down many years ago. Alsike appears to be the most persistent variety. This year for the first time the Common Red clover gave a good yield of hay at the second cutting.

We find that pasturing clover during the fall months has a very injurious effect on the plants; for that reason a fenced field is the most suitable place for clover of all kinds.

The accompanying table gives this year's yield of the different varieties of clover. The soil was a sandy loam and the previous crop was barley. They were all sown on spring ploughed stubble, without a nurse crop. The weeds and volunteer crop was cut the first year when one foot high, and the cuttings left on the ground to act as a mulch.

Varieties.	When sown.	Seed per acre.	Thickness of Aftermath.	Yield of Hay per acre.	
		Lbs.		Tons.	Lbs.
Alsike and Timothy mixed	1902	15	Thin	2	1400
Mammoth Red Clover	1902	20	Fair	2	300
Alsike	1902	20	Thin	1	1200
Common Red Clover, 1st cutting	1902	20	Thick	1	600
" " 2nd "	1902	20	"	1	800
Alfalfa clover, 1st cutting	1902	25	"	1	1200
" 2nd "	1902	25	"	1	1200
" 1st "	1903	25	"	1	800
" 2nd "	1903	25	"	1	400
Common Red Clover, 1st cutting	1903	20	"	1	1600
" 2nd "	1903	20	"	1	1000
White Dutch	1902	20	Thin	..	1600

MILLETS.

As the land set apart for Millets was flooded, a trial was made of sowing them on wheat stubble land, ploughed in spring, and the result was very unsatisfactory. This plant requires a clean and compact soil, with a liberal supply of moisture; all of these requirements were lacking in the land used. The yield of hay was generally much below the average. Moha Hungarian was the only variety that gave a good return.

The size of the plots for this test were one-fortieth acre and the soil a sandy loam. All were sown on May 20 and cut on September 1.

Variety.	Height.	Stage when cut.	Yield of Hay per acre.	
	In.		Tons.	Lbs.
Moha Hungarian	45	Fully headed	6	....
Japan	40	Not headed	3	1600
Italian or Indian	35	"	2	1200
Common Millet	30	Fully headed	2	800
Algerian	65	Not headed	2	....
California	50	"	2	....
White Round French	55	Nearly ripe	..	1600
Pearl or Cat-tail	25	Not headed	..	600

CATTLE.

The herd of cattle on the experimental farm now consists of the following animals:—

Name of Animal.	Breed.	Age.	Weight.
			Lbs.
Alice May	Shorthorn	4 years	1,365
Nancy	"	4 "	1,210
Brandon Myrtle	"	5 "	1,435
Red Knight of Brandon	"	2 "	1,710
Rose of Brandon	"	18 months	890
Lily of Brandon	Ayrshire	2 years	1,145
Dentry	"	2 "	1,020
Haron	"	1 "	1,020
Brandon Maid	Guernsey	2 "	945
Ottawa Prince	"	2 "	1,480
Marie	"	8 months	470
Ruben	Shorthorn Grade	3 "	230
Christie	"	4 years	1,275
Gretchen	"	6 "	1,310
Carrie	"	7 "	1,465
Jennette	"	6 "	1,590
Jenney	"	15 months	530
Margaret	"	11 "	620
Daisy	"	6 "	330
Pet	Ayrshire Grade	5 years	920
Sis	"	17 months	655

MILKING COWS.

The accompanying table gives the length of the milking period and the weight of milk given by a number of the experimental farm cows for the past year:—

Name.	Age.	Breed.	Milking Period.	Pounds of Milk.
Nancy	4	Shorthorn	335 days ending Nov. 30, 1904	6,751
Brandon Myrtle	5	"	292 " "	5,219
Brandon Maid	2	Guernsey	268 " "	4,869
Christie	6	Shorthorn Grade	303 " "	9,241
Carrie	8	"	279 " "	6,934
Gretchen	5	"	267 " "	5,782
Pet	6	Ayrshire	138 " "	3,334

EXPERIMENTS IN FEEDING STEERS.

ONE-YEAR-OLD STEERS COMPARED WITH TWO-YEAR-OLDS.

The twelve steers selected for this test were apparently all shorthorn grades. Six of them were about 18 months old, the others 30 months. All were raised in the neighbourhood of Hamiota, Manitoba.

When purchased in November, 1903, the steers cost $3.25 per hundred pounds live weight and sold in May, 1904, for $4.25 per hundred pounds. The older steers were the most suitable for export purposes, but all were killed in Winnipeg, and the buyer gave the same price for each lot.

After two weeks of preparatory feeding they were divided into two groups, according to age.

All were tied in double stalls and fed all they would eat of the following ration:—

Ration per day for each one-year-old steer—

Corn fodder	15 lbs.
Oat straw	8 "
Corn ensilage	17 "
Swede turnips	40 "
Wheat bran	5 "
Ground grain	3 to 6 "

Ration per day for each two-year-old steer—

Corn fodder	15 lbs.
Oat straw	8 "
Corn ensilage	17 "
Swede turnips	40 "
Wheat bran	5 "
Ground grain	4 to 8 "

DESCRIPTION OF FODDER.

The fodder corn was Pearce's Prolific, cut when in the early milk stage, well cured in the stooks outside and drawn in as wanted. This was cut into one-inch lengths. The straw was mixed wheat and oat. The grain was composed of one-third each of barley, oats and wheat screenings, ground somewhat coarsely. The amount of grain fed was increased slightly each month until the test was completed.

COMPARATIVE GAINS.

One year old steers.	Date.	Weight.	Gain.	Total Gain.
Original weight of steers	Dec. 11, 1903	4,940 lbs.		
Weight at end of 1st term	Jan. 8, 1904	5,235 "	295 lbs.	
" 2nd "	Feb. 5, 1904	5,520 "	285 "	
" 3rd "	March 4, 1904	5,865 "	345 "	
" 4th "	April 1, 1904	6,092 "	227 "	1,152 lbs.

Two year old steers.	Date.	Weight.	Gain.	Total Gain.
Original weight of steers	Dec. 11, 1903	6,725 lbs.		
Weight at end of 1st term	Jan. 8, 1904	7,095 "	370 lbs.	
" 2nd "	Feb. 5, 1904	7,390 "	295 "	
" 3rd "	March 4, 1904	7,765 "	375 "	
" 4th "	April 1, 1904	7,895 "	130 "	1,170 lbs.

COST OF FEEDING.

One-year-old steers—

9,000 lbs. of fodder corn, at $4 per ton	$18 00
4,788 lbs. of straw, at $1 per ton	2 39
5,940 lbs. of turnips, at 5 cents per bushel	4 95
11,058 lbs. of ensilage, at $2 per ton	11 05
2,970 lbs. of bran, at $12 per ton	17 82
2,766 lbs. of chop, at 75c. per 100 lbs.	20 71
	$74 95

Two-year-old steers—

9,360 lbs. of fodder corn, at $4 per ton	$18 72
4,980 lbs. mixed straw, at $1 per ton	2 49
6,180 lbs. of turnips, at 5c. per bushel	5 05
11,466 lbs. of ensilage, at $2 per ton	11 46
3,090 lbs. bran, at $12 per ton	18 54
4,008 lbs. of chop, at 75c. per 100 lbs.	30 60
	$86 86

SUMMARY OF RESULTS.

—	First Cost of Steers.	Value of Feed Consumed.	Price per Steer sold for.	Gain per Day.	Profit per Steer.
	$ cts.	$ cts.	$ cts.	Lbs. Oz.	$ cts.
One year old steers	28 81	12 49	43 15	1 11	1 85
Two year old steers	39 22	14 47	55 92	1 11	2 23

CONCLUSIONS.

The results of this experiment would lead us to the following conclusions :—

First, the amount of gain in weight per day is the same with each lot of steers.

Second, the two-year-olds were slightly more profitable than the one-year-olds.

Third, the feeding of steers provides a ready market on the farm for rough fodder and inferior grain, but unless there is a greater difference than $1 per 100 lbs. between the buying price in the fall and the selling price in the spring, there is very little profit.

EXPERIMENTS WITH SWINE.

BARLEY COMPARED WITH MIXED GRAIN.

Barley is very productive in this country, and the six-rowed varieties can be sown late in the season, after all other seeding is finished, and still escape injury from frost. But few farmers, however, appear to use it extensively for pig feed.

Eight pigs were used for this test, all were cross-bred Berkshire and Tamworths.

The mixed grain used was one-third each of wheat, oats and barley; all the grain was ground coarsely.

Both kinds of feed were valued at 75c. per 100 lbs.

The pigs were purchased at $4 per 100 lbs. live weight, and sold at the close of the test at $5 per 100 lbs.

RATION FED.

Amount and value of food consumed during the fattening term of 70 days, from June 23 to September 1, 1904 :—

—	Grain fed.	Value of feed.
	Lbs.	$ cts.
Pen No. 1, fed barley alone	1,130	8 47
Pen No. 2, fed mixed grain	1,090	8 17

SUMMARY.

—	Weight when bought.	Value when bought.	Weight when sold.	Value when sold.	Value of food.	Profit on each pen.
	Lbs.	$ cts.	Lbs.	$ cts.	$ cts.	$ cts.
Pen 1, fed on barley	362	14 48	616	30 80	8 47	7 85
Pen 2, fed on mixed grain	342	13 68	547	27 35	8 15	5 52

CONCLUSIONS.

First, the pen fed on barley consumed 40 lbs more grain during the fattening period than those fed on mixed grain.

Second, the same pen also made a gain of 49 lbs. more than those fed on mixed grain.

Third, the pen fed on barley made $2.33 more profit than the animals fed on mixed grain.

FEEDING PIGS ON PEASE IN THE FIELD.

Field pease give large returns in this province, but the one great obstacle to their general cultivation is the difficulty in harvesting and threshing the crop. With the object of overcoming this difficulty a trial was made of turning a number of pigs into one acre of nearly ripe pease and allowing them to do the harvesting and threshing.

Ten pigs were used for this test. They were all of mixed breeding and cost on September 3, $4.75 per hundred pounds, live weight, and sold on October 20 for $5 per hundred pounds. It was found necessary to ring them, otherwise they covered many of the pease in rooting up the soil.

The variety of pease used was Canadian Beauty, sown on one acre of summer-fallow land, on May 7. Pigs were turned into the field on September 3, and by October 20, they had all the grain eaten clean.

SUMMARY.

—	Weight when bought.	Value when bought.	Weight when sold.	Value when sold.	Profit on 1 acre peas fed to pigs
	Lbs.	$ cts.	Lbs.	$ cts.	$ cts.
Group of 10 pigs	1,393	66 16	1,670	83 50	17 34

POULTRY.

Three breeds of poultry and their crosses have been kept during the year, namely:—White Wyandottes, Light Brahmas and Barred Plymouth Rocks.

All have kept quite healthy and seventy chicks were raised during the summer. A number of cockerels have been sold to farmers for breeding purposes. Plymouth Rocks are preferred for this purpose.

COMPARISON OF WHITE WYANDOTTES WITH BARRED PLYMOUTH ROCKS AS FATTENING FOWL.

This is a repetition of last year's test, but the comparison is not quite so favourable to the Plymouth Rocks as the previous test.

Four pure bred Barred Plymouth Rock cockerels and an equal number of White Wyandottes were shut up in slatted pens, each 2 x 3 feet, and fed all they would eat of finely ground grain, consisting of one-third each of wheat, oats and barley. This was given in troughs mixed with skim-milk to the consistency of thin porridge.

In the following tables the meal has been estimated at 75 cents per hundred pounds. The fattening period covered 21 days.

Wyandottes (White).

Weight Oct. 31.		Weight Nov. 21.		Gain.		Cost of Food.		Cost per lb. live weight.
Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	$	cts.	Cts.
20	6	25	8	5	2	0	18	3½

Barred Plymouth Rocks.

Weight Oct. 31.		Weight Nov. 21.		Gain.		Cost of Food.		Cost per lb. live weight.
Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	$	cts.	Cts.
20	1	26	1	6	0	0	19	3¼

INCUBATORS FOR HATCHING.

Owing to the late spring here it is difficult to obtain sitting hens early in the season. On this account chickens are often too late for early autumn killing, when prices are the highest. An effort has ben made to overcome this difficulty by using an incubator.

The incubator was filled for the first time last spring, on April 19, with 120 Plymouth Rock and Wyandotte eggs. Only 60 proved fertile, and 30 of these hatched. It was found impossible to obtain broody hens for a comparison in April.

On May 20 another lot of 120 eggs from the same fowls were started in the incubator, at the same time two broody hens were set on eggs from the same fowls. In each case two-thirds of the fertile eggs hatched.

All the chickens were raised in outside brooders and were equally strong, the loss after hatching being only four per cent.

CONCLUSION.

1st. The percentage of chickens from fertile eggs was the same, whether setting hens or incubator was used.

2nd. It is possible to secure earlier chickens by using an incubator.

3rd. A large proportion of the eggs laid in early spring before the fowls have an opportunity to take exercise are not fertile.

BEES.

Of the thirteen colonies of bees placed in the cellar in the fall of 1903, three late and weak colonies died during the winter.

All were removed from the cellar to their summer stands on April 5, as they appeared quite restless. The first pollen was gathered on April 28 from Anemone patens, commonly known as Wild Crocus; this was closely followed by Early Willow pollen.

The months of May and June were not favourable for gathering nectar, but as soon as July set in the bees worked very freely on wild flowers. Perhaps the largest supply was obtained from the Mint family of plants, which were unusually abundant this year, the honey from these plants was very thick, quite aromatic and agreeable to the taste.

Forty pounds of extracted honey was produced per colony, spring count, and eight new swarms obtained.

Bees have now been successfully kept on the farm for a number of years, and I see no reason why the average farmer should not succeed equally well, providing he is located near thickets of wood, where the bees can obtain ready access to abundance of native flowers, most of which secrete nectar, but out in the open prairie at a distance from timber, it may be more difficult to make a success of bee-keeping.

Parties supplied with colonies from this farm last year report having had good success with them.

HORTICULTURE, 1904.

The past season was in nearly every respect an ideal one for the horticulturist. April opened with bright sunny weather, which conditions were very favourable to the successful growing of plants in the hot-bed, and remarkably strong seedlings were ready at planting out time. Perhaps the most gratifying feature in the climatic conditions is the continued absence of spring frosts. Formerly this was the most discouraging factor we had to contend with in horticultural work, resulting, as it frequently did, in the total destruction of the fruit blossoms, and seriously damaging such vegetables as cucumbers, squash, pumpkins, corn and tomatoes. For the past four years these frosts have not been in evidence, and it seems reasonable to hope that in this connection climatic conditions are permanently ameliorated. In the vegetable garden a bountiful crop was harvested. Continuing the practice established some years ago, a complete test was made of one or two kinds of vegetables, this year squash, pumpkins and onions being the vegetables selected.

Such extensive records as these must necessarily be of considerable value to the farmer and market gardener. The fruit crop was also a very satisfactory one. Cross bred apples and Siberian crab apples set heavily, and many varieties of considerable merit fruited for the first time. Plums also produced an abundant crop, among which were some of the best ever fruited on this farm. In the small fruits raspberries gave a very fair crop and showed much improvement over the product of previous years, due principally (in our opinion) to the mulch of green manure given them the preceding fall. Currants also set well, and a moderate crop of excellent quality was gathered, fuller particulars of which will be found under the heading of currants. In the Arboretum the trees have become so thick as render a generous thinning necessary, and a considerable amount of this work has been accomplished.

APPLES, 1904.

Last season again proved favourable for testing these fruits in Manitoba. The absence of spring frosts was followed by a heavy setting, and the somewhat open fall assisted in the ripening of some of the late varieties. The winter of 1903-4 was one of the most severe experienced here for some time past and some damage was occasioned by sun-scald. No permanent injury, however, was sustained, and by cutting off a few of the branches all traces of the trouble was removed. A large number of the varieties under test at the farm are rapidly coming into bearing condition, and each year shows a decided progress in this important branch of work.

STANDARD APPLES.

The following varieties of standard apples, root grafted on *Pyrus baccata*, together with some Russian seedlings, were received from the Central Experimental Farm at Ottawa, in the spring of 1903. The following table shows their condition after having passed through one winter:—

Variety.	Trees No.	Condition 1904.
Hibernal	3	1. Killed back one quarter 1903-4; strong growth 1904.
		2. Wintered well 1903-4; strong growth 1904.
		3. " " "
Wealthy	3	1. Killed to near ground 1903-4; strong growth 1904.
		2. Killed to ground 1903-4; strong growth 1904.
		3. Killed back one-quarter 1903-4; fair growth 1904.
North-western Greening	2	1. Killed to ground 1903-04; strong growth.
		2. Died 1903-4.
McMahon White	3	1. Killed back slightly 1903-04; fair growth 1904.
		2. " " " "
		3. Killed back one-quarter 1903-4; strong growth 1904.
Longfield	2	1. " " fair growth 1904.
		2. " " strong growth 1904.
Yellow Transparent	3	1. Killed to ground 1903-4; strong growth 1904.
		2. " " fair growth 1904.
		3. " " strong growth 1904.
Pointed Pipka	3	1. Killed back slightly 1903-04; strong growth 1904.
		2. Killed to near ground 1903-04, strong growth 1904.
		3. Killed to ground 1903-4; fair growth 1904.
Duchess of Oldenburgh	3	1. Killed back one-quarter 1903-4; fair growth 1904.
		2. Killed to ground 1903-4; strong growth 1904.
		3. Wintered fairly well 1903-4; very weak growth 1904.
Scott's Winter	3	1. Died 1903-4.
		2. Killed to ground 1903-4; fair growth 1904.
		3. " " weak growth 1904
McIntosh Red	2	1. Killed back one-quarter 1903-4; strong growth 1904.
		2. Killed to near ground 1903-4; fair growth 1904.
Russian Seedling No. 3	2	1. Killed back slightly 1903-4; fair growth 1904.
		2. Wintered well 1903-04; strong growth 1904.
Russian Seedling No. 7	2	1. " " "
		2. " " "
Russian Seedling No. 18	3	1. Killed back slightly 1903-04; fair growth 1904.
		2. " " strong growth 1904.
		3. Wintered well 1903-4; strong growth 1904.
Russian Seedling No. 22	3	1. Killed back slightly 1903-4; strong growth 1904.
		2. Killed to ground 1903-4; fair growth 1904.
		3. Killed to near ground 1903-4; strong growth 1904.
Russian Seedling No. 26	1	1. Killed to ground 1904; strong growth 1904.

Scions of the following standard apples were received from the Central Experimental Farm in 1903, and were top grafted on *Pyrus baccata* in the orchard south of the barn: Patten's Greening, Duchess, Yellow Transparent, McMahon White, Wealthy, Longfield, Charlamoff, Malinda, North-western Greening, Hibernal. These were all dead in the spring of 1904.

A number of scions of named cross-bred apples were received from the Central Farm for the same purpose. The following table shows their condition:—

Variety.	Condition 1904.
Aurora	Killed back slightly, 1903-04. Strong growth, 1904.
Carleton	" " " " " "
Ruby	Received, 1904. Fair. " "
No. 218	" " " " "
Pioneer	Wintered well, 1903-04. Strong " "
Derby	" " " " "
Northern Queen	" " " " "
Rideau	Received, 1904. Fair " "
Alberta	" failed to unite.
Jewel	" Weak " "
Elsa	" did not take.
Novelty	Wintered well, 1903-04. Strong " "
Columbus	Received, 1904. " " "
Tony	" " " " "

THE WEALTHY APPLE.

In previous reports mention has been made of the hardiness of an apple received from Mr. A. P. Stevenson, of Nelson, as the Wealthy. Although this tree has fruited for one or two years past, the fruit has been stolen before it approached maturity, consequently we could not verify the correctness of the name.

From specimens grown this season it is evident that it has been mis-named, as the fruit is much too small for Wealthy, and lacks all other characteristics of that variety. It is probably one of the larger crab apples.

DUCHESS OF OLDENBURGH.

Some scions of this variety were received from H. L. Patmore, a local nurseryman, in 1902, and were top grafted on Pyrus baccata. A portion of these were used in the Pyrus orchard south of the barn, and the balance were put on to a single specimen of *Pyrus baccata* growing on the hillside. The spring following, all in the south orchard were entirely killed, while those on the hillside were perfectly sound. The latter has continued hardy, and a few flowers were produced last spring, though not in sufficient quantity to ensure a set. Should this hardiness prove permanent a valuable addition will be made to our list of apples.

CROSS NO. 179.

In the hillside cross-bred orchard under the above number there fruited the past season the largest apple yet grown on the experimental farm Though the tree is quite small it bore 15 fruits nearly as large as the Wealthy apple, of good colour and flavour, and which ripened early. The tree in question is planted in a very exposed position, and appears to be reasonably hardy. The identity of the cross has not yet been established.

CROSS-BRED SEEDLINGS, 1904.

A large number of cross-bred seedlings fruited for the first time this season, many of which were very promising. All of these show a very marked improvement over Pyrus baccata, the pistillate parent, and would be gladly welcomed by the farmers of Manitoba and the North-west. The most promising of these crosses yet fruited are:—

Pyrus baccata x Wealthy. Pyrus baccata x Beautiful Arcade.
" x Tetofsky. " x Krimskoe.

The Beautiful Arcade cross, though one of the smallest in size, is entirely free from astringency and has a fine aromatic flavour.

SEEDLING OF TRANSCENDENT.

One of the seedlings of the Transcendent fruited during the past season for the first time. The fruit was handsome in appearance, and considerably larger than the parent variety, and much was expected from it. A test of its flavour when ripe, however, speedily dissipated our hopes, as it proved to be excessively astringent, and with hollow core.

SEEDLINGS OF MARTHA CRAB.

These seedlings, which have been referred to in previous reports, are likely to prove one of the most satisfactory additions to the collection of apples. A number of them came into bearing for the first time this year, and, in some a marked improvement was shown over those which have fruited in the past. Two of them were superior to the 'Transcendent' crab, both in size and flavour. The best of them have been named and will be propagated so as to admit of a more general test.

SEEDLINGS OF THE SNYDER CRAB.

Two seedlings of the Snyder crab fruited the past season, both of considerable merit. The fruit though somewhat small in size, was of excellent flavour and made a capital preserve. Most of the seedlings of Snyder have proved tender, but these are promising for hardiness.

TONKA CRAB.

This variety still continues hardy and the original tree from which our scions were obtained again fruited the past season, but by reason of its out-of-the-way location and the consequent difficulty of protecting it the fruit was again stolen before it had gained maturity. A sufficient number of trees have been grafted, however, to perpetuate the variety, some of which show promise of fruit next season. As these are in a fenced orchard, we will doubtless have an opportunity of testing the mature product before long.

TRANSCENDENT CRAB.

Several of the trees in the Pyrus orchard have been top-grafted with the Transcendent crab and have now passed through three winters. So far they have proven quite hardy, and this season some of them fruited for the first time. The fruit was of good size and entirely free from blemish. This is encouraging, as not many years ago we found it difficult to winter the Transcendent. Probably much of the success of the experiment is due to the splendid stock of the Pyrus baccata, the hardy Siberian crab introduced by the experimental farms.

PRIDE OF MINNEAPOLIS.

Scions of this variety were received from H. L. Patmore in 1902, and top-grafted on Pyrus baccata. Though spoken of highly, we do not see very much to recommend it, judging by the fruit produced this year. It is thoroughly hardy, is very late, and of poor flavour, and not equal to the Transcendent crab in size.

PYRUS BACCATA.

A very heavy crop of fruit was again harvested from this variety, many of the trees producing quite large fruit of fair flavour.

PLUMS.

We have again the pleasure of recording a very heavy crop of this fruit at the Brandon farm, the majority of the trees being so heavily laden as to weigh the branches to the ground. The most interesting feature, however, was the fruiting for the first time of three native varieties, superior to anything we have yet noted, both in earliness and flavour. Three trees, received from Mr. M. Major, of Winnipeg, ripened their fruit early in August, fully two weeks earlier than any other trees on the farm. The product was of comparatively large size, deep red in colour when ripe, the skin very sweet and juicy, with no signs of astringency, while the stone was not out of proportion to the flesh (a serious drawback to many of the types under test.) The first fruit of all three trees was nearly identical, and consequently we have given them the same name, viz., 'Major.' Another tree of exceptional merit was received from the Souris district, and though not quite equal to the former, is well worthy of propagation, and has been given the name of 'Souris.' The last one worthy of special mention is the only yellow variety yet fruited at the experimental farm. When ripe, this is a light yellow in colour, with a few faint reddish dots on the sunny side. The flavour is quite distinct, very sweet and this plum has been named 'Brandon.'

The first of these varieties is greatly superior to the average native plum and is delicious either as dessert or for preserving. Of the seedlings of the American plum (Prunus Americana) only those of 'Cheney' have been found satisfactory, none of the others ripening early enough, and the larger portion of these late varieties have been removed to make room for more promising specimens. A quantity of seed was gathered from the earliest and best native trees, was sown this fall, and it is hoped that a sufficient number of seedlings will be obtained to plant out a considerable area, so that further selection may be made.

CURRANTS.

A large number of varieties of this fruit was received from the Central Experimental Farm in the spring of 1902. All became well established, and during the past

season produced a sufficient crop of fruit to warrant comparisons. Just as the fruit commenced to ripen the currant worm appeared and threatened to defoliate the bushes, but a timely application of white hellebore, one or two ounces to a pailful of water, applied with a spray pump, quickly stopped their depredations, and no serious damage resulted. Following will be found the names of the varieties under test, together with notes on the same :—

CURRANTS, 1904.

Variety.	Colour.	Flavour.	Length of Spike.	Fruit on Spike.	Weight from one Tree.
			In.		Lbs.
White Imperial	White	Slightly acid	2¼	Thicklyset	2¼
Climax	"	Sweet	2½	"	1¼
Large White	"	"	2¼	"	1½
Defiance	Red	"	2½	"	1⅝
Houghton Castle	"	"	2½	"	1½
Giant Red	"	Fairly sweet	2⅝	"	3½
Verrier's White	White	Very fine	3	Thinly	2½
White Grape	"	Slightly acid	2¼	Thicklyset	1½
White Kaiser	"	Sweet	2¾	"	1¾
Mattie	Black	" thin skin	2	"	1 15/16
White Cherry	White	"	2¼	"	2 1/16
Star	Black	Fairly sweet and juicy, thickish skin			1¾
Eagle	"	Sub-acid and juicy, thick skin			1½
Black Grape	"	Fairly sweet and dry, thin skin			1¾
Black English	"	" juicy, thin skin			1¾
Kentish Hero	"	Sub-acid and juicy, thickish skin			1⅝
Merveille de Gironde	"	" " thin skin			2¼
Stirling	"	Sweet and juicy, thin skin			2½
London Red	Red	"	2¼	Thicklyset	1½
Lewis	"	"	2	Thinly "	1 15/16
Dominion	Black	Sub-acid, not juicy ; skin moderately thick			1½
Beauty	"	Sweet and juicy, thickish skin			1 15/16
Baldwin's Black	"	Sub-acid and juicy, thick skin			2¼
Winona	"	Sweet and dry, thin skin			1 1/16
Standard	"	" thick skin			2½
Ethel	"	Fairly sweet and juicy, thin skin			1⅝
Oxford	"	Sweet and juicy, thin skin			1¼
Brandenburg Black	"	" " thickish skin			1 1/16
Wilder	Red	Fairly sweet	2½	Thinly set	1¼
White Dutch	White	"	2½	"	1¼
Eclipse	Black	Sweet, thin skin			1¼
Orton	"	Sweet and juicy, thin skin			1⅝
Prince of Wales	"	Fairly sweet and juicy, thin skin			1⅝
Stewart	"	Slightly acid, thin skin			1⅝
Gewohnliche	"	Fairly sweet and dry, thin skin			1¼
Clipper	"	" " "			1 1/16
Percy	"	Sweet and juicy, thick skin			1¼
North Star	Red	"	2¼	Thicklyset	2¼
Moore's Seedling	"	"	2½	"	2¼
Cumber	"	Extremely acid	2⅝	"	2½
Fertile D'Angers	"	Sub-acid and juicy	2¼	"	1¼
Simcoe Red	"	Acid and juicy	2	Thinly set	3¼
Pomona	"	Sweet and juicy	2½	Thicklyset	2½
Prince Albert	"		3	Thinly set	2
Early Scarlet	"	Sweet and dry	2	"	1 1/16
Frauendorfer	"	Slightly acid	2½	"	1⅝
Red Grape	"	Sweet and juicy	2	Thicklyset	1½
Long Bunch Holland	"	"	2	"	1¼
Rankin's Red	"	"	2	"	1¼
Red Dutch	"	"	2	"	3
La Conde	"	"	2	"	1¼
Fay's Prolific	"	"	1⅜	Thinly set	1¼
New Red Dutch	"	"	1¾	Thicklyset	2½
Admirable	White	"	2½	"	2¼
Goliath	Red	"	1½	"	1¼
Versailles	"	"	1¾	"	2

GOOSEBERRIES.

Twenty-five varieties of gooseberries were received from the Central Experimental Farm, Ottawa, and planted here on April 22, 1903. Nearly all of these survived the winter of 1903-4, and only a slight amount of winter-killing was noticeable. The plants being quite small, only one variety fruited this year, viz.: the Downing. The fruit of this was quite large, of an elongated shape, and with a perfectly smooth skin. The flavour was excellent.

RASPBERRIES.

The raspberry crop this season was much superior to that of recent years, and it may be that much of this improvement may be attributed to the following cause: For some time past it has been customary here when laying down the canes in the fall of the year for winter protection to use a plough for throwing a furrow over the tips of the canes. Though this method was effective in so far as protection was concerned, it appeared to seriously injure the fibrous roots which are so near the surface, and the following year the canes showed a more or less stunted growth. Two years ago this mode of operation was changed by pressing the canes flat with a long scantling and throwing green manure over the tips. This has resulted in a great improvement in both canes and fruit as compared with the old method, and, as the strawy manure is left on the ground during the ensuing summer, it acts as a mulch, conserving the moisture, and adding in no small degree to the success of the experiment.

STRAWBERRIES, 1904.

A number of plants of the Alpine ever-bearing strawberry were received from the Central Experimental Farm in the spring, and all were quite vigorous before winter set in. Though not as large as the standard varieties these are extremely hardy, and continue their fruit production throughout the entire season, which should make them specially valuable for Manitoba and the North-west.

HEDGES, 1904.

All the small test hedges on the farm continue to do well, one composed of the native Buffalo berry (*Shepherdia argentea*) calling forth much favourable comment from visitors. This hedge is now about 5 feet in height, and is very compact and symmetrical, lending itself readily to the pruning shears, and as it produces thorns abundantly it is almost impenetrable.

The shelter blocks in the south-west corner of the farm surrounded by double maple hedges having become too crowded, every alternate hedge was cut out during the past season, thus reducing the number of blocks about one-half, and giving increased space for planting.

FALL SOWING AS COMPARED WITH SPRING SOWING OF CARAGANA ARBORESCENS.

Until last year, we have invariably sown the seed of this desirable shrub in the spring, but an experiment was made during the fall of 1903 to ascertain if any advantage accrued from fall sowing. A number of drills were sown in the fall of 1903, and sufficient space left alongside for a duplicate sowing the spring following. The results point strongly to the advisability of fall sowing; the plants from the fall sown seed averaging 6 inches taller than those from the spring sown seed, and showing a much greater vigour.

EXPERIMENTS IN COVERING TENDER SHRUBS FOR WINTER PROTECTION, PHILADELPHUS (MOCK ORANGE.)

Mention was made on page 344 of last year's report of experiments made to ascertain the possibility of flowering this beautiful, but tender shrub, by means of winter protection. During the fall of 1903 a further test was made, the following varieties being included:—

Seedling of Martha Crab, at the Experimental Farm, Brandon, Man., 1904.

Philadelphus grandiflorus. *Philadelphus deutziaflorus.*
" *coronarius.* " *inodorus.*

The branches were bent to the ground and sufficient soil was thrown over the tips to retain them in that position. The result was entirely satisfactory, as all varieties flowered, *P. grandiflorus* and *P. deutziaflorus* very heavily. As there are many of these half-hardy shrubs, the branches of which kill-back more or less each winter, it would seem well worth while to go to this small amount of labour in order to secure flowers. This test was continued on a larger scale this year, and many other tender varieties were covered, the material used being fresh manure, and the results will be reported on next season.

ARBORETUM, 1904.

Very little addition was made to the Arboretum during the past season, the principal portion of the work done being a generous thinning in portions of the plantation which were becoming crowded. Three trees of Populus Simoni were received from H. L. Patmore, nurseryman, Brandon, two of which were living on the approach of winter.

VEGETABLE GARDEN.

ONIONS, 1904.

Thirty-eight varieties of onions were sown in the open on April 28 with Planet Jr. hand drill, in drills 16 inches apart. Although 12 inches apart is the usual distance recommended for this vegetable, we have found that 16 inches is preferable, as with the former distance the rows are too crowded to admit of easy cultivation. A gratifying feature in this test was the uniform germination, there being only two varieties whose germinating power was so low as to not admit of comparisons being made. About a month previous to pulling, the tops were pressed down to the ground, which greatly facilitated ripening, and when they were pulled on September 3, a large number of them were nearly ripe. They were brought inside on September 17, and after lying on the barn floor a week or two, were in good condition for storing. Several of the Italian varieties, though producing large bulbs, do not seem desirable for cultivation here as they lack firmness, and have a loose skin, which would detract form their keeping properties. *Red Madeira* appears to be one of the 'bunching' varieties only suitable for use in countries where they are able to stand the winter, and where they are used as spring onions. Of the pickling varieties *Adriatic Barletta* again proved its superiority, giving the largest percentage of suitable bulbs for this purpose. In connection with this vegetable we would again call attention to the necessity of early sowing. Various complaints have been received here, in regard to the non-ripening of onions, and inquiry has usually disclosed the fact, that the sowing was done too late.

It is important that sowing take place as soon as the soil is in condition in the spring, in fact if a situation is available which is protected from the spring wash, fall sowing may be employed to advantage, as by this means the earliest possible germination is secured. The following list contains the most suitable varieties for cultivation in this province.

1. Extra Early Flat Red.
2. Giant Yellow Globe.
3. Prize Taker Yellow.
4. Red Wethersfield.
5. Yellow Globe Danvers.
6. Southport Yellow Globe.
7. Early Red Globe.
8. Yellow Cracker.
9. Southport Red Globe.
10. Australian Brown.
11. Michigan Yellow Globe.
12. Early Flat Danvers.
13. Australian Yellow Globe.
14. Adriatic White Barletta.

Following will be found the result of the test arranged in order of productiveness:—

ONIONS—TEST OF VARIETIES.

Variety.	Colour.	Shape.	Ripeness.	Size.	Yield per Acre.	Remarks.
					Bush.	
Giant Brown Rocca	Reddish brown..	Globular..	Nearly ripe.	Large	641	Rather late for Manitoba.
White Tripoli	White.....	Flat.....	Not ripe....	"	591	Not suitable for storing.
Mammoth Pompeii..	Deep red.....	"	Nearly ripe.	"	580	Not specially desirable.
Mammoth Silver King.	White..... ..	Flattish ..	" " .	Med. to large .	563	Not desirable variety.
Prize Taker Yellow.	Deep yellow....	Globular..	Fully " .	" " ..	549	A good onion.
Red Tripoli	Light red	" ..	Nearly " .	" " ..	527	Rather late for Manitoba.
Southport Red Globe	"	" ..	Fully " .	Medium ...	500	A desirable variety.
Early Red Globe....	Deep red...	" ..	" " .	Small to med..	492	A good early variety.
Trebon's Large Yellow.	Pale yellow.....	" .	" " .	Medium	488	A fine keeper.
Gibraltar	Light "	" ..	Nearly " .	Med. to large..	477	A promising variety.
Prize Taker Red Globe.	Medium red....	" ..	Fully " .	Medium ...	475	A first class variety.
Giant Yellow Rocca	" yellow .	" ..	Not " .	"	463	Too late for Manitoba.
Southport Yellow Globe.	Deep " .	" ..	Fully " .	Med. to large..	459	An excellent var. for Manitoba.
Red Wethersfield ..	" red	Flattish ..	" " .	" " ..	429	A first class variety.
Giant Yellow Globe.	" yellow.....	Globular..	" " .	Medium.....	419	A good early variety.
Yellow Globe Danvers.	" "	" ..	" " .	Med. to large..	418	A standard variety.
Spanish King. . ..	Yellow.....	Flattish ..	Nearly " .	Medium	409	Rather late for Manitoba.
Extra Early Flat Red.	Bright red	" ..	Fully " .	Med. to small.	407	A very early variety.
Red Bassano.	Deep "	" ..	Nearly " .	Medium	401	Rather late for Manitoba.
Golden Pheasant ...	" yellow.....	" ..	Fully " .	"	392	A new variety of considerable merit.
Yellow Globe Danvers.	" "	Globular..	" " .	"	379	Good early variety.
White Portugal.....	White...	Flattish ..	Not " .	"	375	Not a desirable variety.
Australian Brown ..	Reddish brown..	Globular..	Fully " .	"	363	A good early variety.
Northland.....	Deep yellow....	Flattish ..	" " .	"	353	" "
Yellow Cracker.....	" "	" ..	" " .	"	314	" "
Michigan Yellow Globe.	" "	Globular..	" " .	Med. to large..	298	A first class variety.
Market Favorite Keeping.	Brown yellow...	Flattish ..	" " .	Medium. ...	291	A good keeper.
Round Hard Dutch.	White	Flat.....	" " .	Small to med..	291	Poor as pickler or large onion.
Australian Yellow Globe.	Deep yellow	Globular..	" " .	" " ..	291	Very badly mixed.
Red Madeira	Very light pink.	" ..	Not " .	Med. to large..	200	Late and very thick-necked.
Paris Silver Skin....	White.....	Flat.....	Fully " .	Small to med..	183	Too many large tubers.
Small Barletta.....	"	"	" " .	Small	175	A first class pickler.
Small Silver Skin...	"	"	" " .	"	163	Of only fair quality.
White Queen.....	"	"	" " .	Small to v. sm.	161	Poor as pickler or large onion.
White Maggiagola..	"	"	" " .	" to med.	156	Too many large bulbs.
Early Flat Danvers	Deep yellow....	Flattish ..	" " .	Medium.....	84	Germination too poor for proper comparison.

Red Welsh, light red, of no value except a bunching onion (no bulbs formed).

ONION (SETS) 1904.

The following varieties of onion sets were tested during the past season :—

Yellow Dutch sets,	Shallots sets
English Multiplier sets,	Top of Button sets,
White Multiplier sets,	Garlic sets.

These were planted in the open on April 28, and all produced a good crop. Yellow Dutch sets are by far the most useful, as they usually give heavy returns and ripen very early. The Shallot is an excellent keeper, though small in size, and is much in demand here. The White Multiplier would be satisfactory for pickling purposes, but does not equal the seed onions for this purpose, and is a poor cropper.

SQUASH AND PUMPKIN.

Thirty-seven varieties of squash and pumpkin were sown in the open on May 23, 1904, and nearly all germinated well. As usual, a heavy crop was harvested, many of the varieties ripening. A number of complaints are received from growers throughout the province in regard to their inability to grow this vegetable satisfactorily, and we have deemed it advisable to mention one very important factor in the successful cultivation of this class of vegetables.

Squash and pumpkins produce the male and female flowers separately on the same plant, and in order to ensure the setting of the fruit, it is necessary that the pollen from the male flower should be brought into contact with the female flower. When there are bees in the immediate vicinity, this operation is accomplished most thoroughly by their agency, but in the absence of these insects hand pollination is sometimes necessary. The process is extremely simple and consists in removing the male or staminate flower as soon as it is fully open, and transferring it to the female or pistillate flower, which latter is readily distinguished by the immature fruit at its base. When the vines have attained a moderate length, the ends of the runners should be nipped off. This brings several flowers of both sexes into bloom simultaneously, allowing fertilization to be accomplished. If this measure is adopted, growers are likely to have much better success. The following varieties proved most suitable for Manitoba :—

PUMPKINS.

1. *Sweet or Sugar.*—A small variety of excellent flavour and texture, ripening early, and excellent for pie purposes.

2. *Japanese Pie.*—Somewhat similar to the foregoing.

3. *Winter Luxury.*—A medium sized variety, light yellow in colour, densely netted and resembling a large musk melon. Fairly early and of fine texture.

4. *Connecticut Field.*—A large yellow variety generally grown for feed purposes, but also makes a good pie, early and very productive.

Mammoth Tours.—This was the largest variety grown this season, and would be useful for feed purposes.

SQUASH.

English Vegetable Marrow.—A standard variety. Productive and early and one of the best for use as a vegetable.

Long White Bush Marrow.—A bush form of vegetable marrow. Early and productive and resembling the English vegetable marrow in texture and flavour.

Extra Early Orange Marrow.—This variety still holds its position as the best variety for Manitoba. It is quite equal to a pumpkin for pie purposes, very early and productive and a splendid keeper.

The results of this test were as follows :—

SQUASH AND PUMPKINS—TEST OF VARIETIES.

No.	Variety.	Colour.	Texture and Flavour.	Ripeness.	Average Weight.
1	Connecticut Field	Deep yellow	Poor feed	90 p. c. ripe	28 pounds.
2	Golden Oblong	"	Fair	25 "	6 "
3	Grey Mammoth	Greyish green	For feed	50 "	28 "
4	Japanese Pie		Very good	80 "	8 "
5	Large Cheese	Deep yellow	Somewhat coarse	90 "	18 "
6	Mammoth Tours	Grey and green	For feed	75 "	35 "
7	Negro	Deep yellow	Fair	5 "	7 "
8	Red Etampes	Reddish yellow	Very good	5 "	5½ "
9	Striped Custard		Did not nearly approach maturity.		
10	Sweet or Sugar	Deep yellow	Very good	85 "	6 "
11	Tennessee Sweet Potato		Did not nearly approach maturity.		
12	Winter Luxury	Light yellow	Very good	75 "	10 "
13	Bay State (Squash)	Greyish green	Not ripe	Not ripe	10 "
14	Boston Marrow		Did not nearly approach maturity.		
15	Brazillian Sugar	Light yellow	Not ripe	"	7 "
16	Canadian Crookneck	Dark green	"	"	5 "
17	Cocozelle	Green white	Very good	50 p. c. ripe	9 "
18	Delicata (Squash)	Light yellow	"	5 "	11 "
19	Early Golden Bush	"	Poor	10 "	4 "
20	Early Golden Bush	"	"	50 "	3½ "
21	English Vegetable Marrow	Yellowish white	Very good	90 "	8 "
22	Essex Hybrid (Squash)	Terra cotta	Fair	10 "	10 "
23	Ex. Early Orange Marrow	Reddish yellow	Very good	95 "	7 "
24	Faxon (Squash)	Light "	"	10 "	11 "
25	Fordhook (Squash)	Dark green	Not ripe	Not ripe	7½ "
26	Golden Hubbard	" yellow	Very good	5 p. c. ripe	7 "
27	Hubbard (Squash)	" green	"	A few ripe	11 "
28	Long White Bush Marrow (Squash)	Yellowish white	"	90 p. c. ripe	9 "
29	Long Island Bush (Squash)	" "	"	50 "	3½ "
30	Marblehead "	Green and white	Not ripe	None ripe	8 "
31	Mammoth Whale "	Light green	For feed	75 p. c. ripe	27 "
32	Pikes Peak "	Green and white	Very good	Nearly ripe	9 "
33	Summer Crookneck "	Light yellow	Poor	50 p. c. ripe	3 "
34	Turban "	Terra cotta	Very good	65 "	11 "
35	Warty Hubbard	Dark green	"	A few ripe	8 "
36	Warren	Light yellow	"	10 p. c. ripe	14 "
37	White Bush Scallop	White	"	75 "	4 "

CUCUMBERS.

Nine varieties of cucumbers were sown in the open on May 23, 1904, in hills 5 feet apart each way, and as usual a very heavy crop of fruit was harvested before frost. Following is the result of the test arranged in order of earliness :—

Variety.	Germination.	Average Weight.	Productiveness.	Average Length.
		Ounces.		Inches.
Early Frame	Very good	4	Very productive	6
Early Green Cluster	"	4	" "	6
Chicago Pickling	Good	8	Moderately prod'tive	8
Green Gherkin	"	3½	" "	4
Cumberland	Fair	12	Very "	10
Early White Spine	Good	9	Not "	9
Improved Long Green	"	10	" "	9
S. B. Evergreen	Poor	9	Fairly "	8
McKenzie's Prolific	Not one seed germinated.			

N.B.—Early Frame, Early Green Cluster, Paris Pickling and Cumberland were the cream of the varieties tested.

CABBAGE, 1904.

Ten varieties of cabbage were sown in cold frame on April 21, and set out in the open on May 31. With two exceptions the germination was exceptionally good and a heavy crop was harvested. Following will be found a list of varieties tested, together with average weights of heads, arranged in order of earliness :—

Variety.	Germination.	Weight.	Shape.
		Lbs.	
Paris Market	Good	7½	Conical.
Extra Early Express	"	6¾	"
Early Enfield	Fair	6	"
Early Jersey Wakefield	Good	7½	"
Midsummer Savoy	"	6	Flattish.
Early Winningstadt	"	10	Conical.
Fottler's Drumhead	"	29	Flat.
Red Drumhead	"	12	"
Green Globe Savoy	"	8	Flattish.
Superb Dwarf Imperial	Did not germinate.		

GARDEN PEASE, 1904.

Seven varieties of garden pease were sown in the open on May 10, in double rows 3 feet apart. With one exception the germination was good, and a splendid crop was harvested. All varieties ripening their seed.

Following is the result arranged in order of earliness:—

Variety.	Length of pod.	Number of peas.	Flavor.	Productiveness.
S. & B. Extra Early	2½ in.	5 to 6	Fair	Mod. productive.
Extra Early Manifold	2⅝ "	5 " 6	Good	Very productive.
Gradus	4¼ "	8 " 9	Very good	Not "
American Wonder	2¾ "	5 " 6	Good	Very "
Yorkshire Hero	4¼ "	7 " 8	Very good	Fairly "
Improved Stratagem	4½ "	8 " 9	"	" "
Extra Early Leviathan	Did not germinate.			

We would again call special attention to the variety *Gradus*. This is beyond question the earliest large pea yet tested here. The pods are long, and well filled with pease of large size and exceptional quality, and though not a productive variety, the qualities of earliness and flavour which it possesses, make it well worthy of a place in the garden.

TOMATOES.

Four varieties of tomatoes were sown in boxes in hot-bed on April 8, 1904, and after transplanting were transferred to the open ground on June 8, 1904. The varieties represented were, Simmers' Earliest, Red Currant, Sparks' Earliana and Earliana. All produced some ripe fruit, there being comparatively little difference between the two Earliana's either in productiveness or earliness, both of them were earlier ripening than Simmers' Earliest. The Red Currant tomato is a small fruited variety, producing its fruit in long bunches, similar to the Currant, and is of fine flavour, making a capital

preserve. It has also the merit of earliness. The Earliana seems to be the variety best suited to north-western conditions.

TOBACCO, 1904.

Six varieties of tobacco were grown during the past season. The seed was sown in boxes in the hot-bed on April 15, and after transplanting, the plants were set out in the open on June 15, and were especially strong and vigorous. Despite the somewhat cool season, the product attained a greater degree of maturity than in any previous tests, and it seems quite probable that we may yet succeed in growing tobacco satisfactorily in Manitoba. The plants were set out in rows 3 feet apart, and 3 feet apart in the row. During the summer the flowers were pinched off as fast as they appeared, all suckers were removed, and beyond some damage occasioned by heavy winds, the leaves were nearly perfect.

Following are the leaf measurements of the different varieties under test, together with the stage of ripeness reached.

No. 1. White Burley.—Dimensions of leaf: Length, 2 feet 5 inches; breadth, 16 inches. Commencing to colour.

No. 2. Small Red Canadian.—Dimensions of leaf : Length, 26 inches ; breadth, 17 inches. Commencing to colour.

No. 3. Primus.—Dimensions of leaf : Length, 26 inches ; breadth, 15 inches. Quite immature.

No. 4. Connecticut.—Dimensions of leaf: Length, 28 inches; breadth, 14½ inches. Quite immature.

No. 5. Simmers' Spanish.—Dimensions of leaf: Length, 24 inches; breadth, 12 inches.

No. 6. Quesnel.—Dimensions of leaf: Length, 16 inches; breadth, 12 inches. Nearly ripe. The earliest of all tested.

It will be seen from the above that the most promising varieties for Manitoba of those tested are: Quesnel, White Burley and Small Red Canadian.

FLOWER GARDEN.

With the overflowing of the Assiniboine river the past spring, and the consequent flooding of the site of our annual flower garden, the prospects for a floral display did not seem at all promising in the early part of the season. After the water receded, the soil was sour, owing to the length of time it had been covered, and it did not seem possible for plants to thrive in it. However, the bed was given a thorough digging, fully two spades deep, and left in a rough condition for a week or ten days in order to give it an opportunity for mellowing. At the expiration of this time a thorough raking was given and the seedlings were planted. The plants grew luxuriantly and flowered profusely, the garden being fully as attractive as in previous years. The following annuals may be of interest :—

Abronia umbellata.—A pretty little trailer of easy cultivation and producing compact little trusses of pink flowers profusely.

Bartonia Aurea.—This was one of the most satisfactory annuals ever grown here. The large bright yellow flowers are produced very abundantly, a single plant covering a space three feet square. Hardy and easy of cultivation.

Nemophila maculata.—A pretty little annual, very dwarf and compact in habit, flowering freely. The colour of the flowers being a very light blue with a dark blue blotch at the base of each petal. Seems to prefer a shady situation.

Phacelia grandiflora.—A member of the Borage family, not valuable, except for a collection.

Whitlavia grandiflora.—A very pretty and free flowering member of the Borage family. The flowers are of an intense blue colour, and are produced for a long period, slightly difficult to transplant.

Schizanthus grandiflorus oculatus.—This was one of the most admired of all the annuals grown this season. It is remarkably floriferous, the plant attaining a large size, and being literally covered with its small orchid-like flowers of every shade. Hardy and easy of cultivation.

Sanvitallia procumbens.—A trailing annual producing numerous small (sunflower-like) flowers of no special value.

ANNUALS SOWN OUTSIDE.

As many farmers have not the time to spare for a hot-bed, we have for several years experimented in the sowing of annuals outside, and have found that a very creditable flower garden may be had by this means.

The varieties sown this year were as follows, the seed being sown thinly in rows, from May 6-10, two feet apart:—

Nasturtium Lobbianum.
Sweet Alyssum.
Abronia umbellata.
Brachycome iberidifolia.
Candytuft.
Clarkia pulchella.
Clarkia pulcherrima.
Clarkia alba.
Coreopsis Drummondii.
Coreopsis tinctoria.
Coreopsis Hybrida.
Godetia rubicunda splendens.
Godetia Whitneyi.
Godetia Lady Albemarle.
Linum grandiflorum roseum.
Poppies mixed.
Portulaca double.

All these flowered abundantly, the Godetia and Clarkia were especially showy and were much admired by visitors. By adopting this plan a very fine flower garden may be had with very little labour and expense.

PERENNIAL FLOWERS.

All the herbaceous perennials growing on the farm made a fine showing during the past season. A number of the clumps were divided this fall, and a new border commenced on the hillside along the main road, which will allow of easy access to visitors.

IRIS KOEMPFERI (JAPAN IRIS).

A very welcome addition was made to our collection of perennials by the receipt of a number of plants of this beautiful iris from the Central Experimental Farm, Ottawa. Nearly all became well established before winter, and a light covering of strawy manure was given them on the approach of severe weather. This is the most beautiful type of iris known, and we are looking forward with pleasure to their flowering next season.

COLCHICUM AUTUMNALE.

Mention of this bulb was made on page 351 of last year's report, and we have deemed it advisable to again call attention to its unique merits. After severe weather has set in, and often when the ground is covered with snow, this pretty little flower pushes through and makes a really beautiful sight, contrasting strongly with its dull surroundings. A bed of this would be a valuable acquisition to any Manitoba garden.

TENDER PERENNIAL BULBS.

A test was made some years ago to ascertain the possibility of flowering some of the tender bulbs, such as Hyacinths, Narcissi, &c., by means of specially heavy covering. The results were entirely satisfactory, the bulbs coming through the winter in good condition and flowering well. A similar experiment is being tried the present autumn. After planting, the bed was covered with two thicknesses of building tar paper, extending about four feet outside the bed, and on top of this, three feet of green manure was placed.

PROPAGATION OF TREES FOR THE FORESTRY BRANCH OF THE DEPARTMENT OF THE INTERIOR.

All the one million and a half of trees grown here in 1903 for the above department were distributed this spring to farmers in different parts of the province. They were unusually large and vigorous for seedlings and proved highly satisfactory to the farmers receiving them.

About one million trees were grown here this year for future distribution by the Forestry Branch, these were all taken up quickly and with very little expense, by means of a tree-digging plough, and all were healed in in good season ready for spring shipping.

DISTRIBUTION OF GRAIN, POTATOES, &c.

The usual distribution was made of grain, potatoes, maple seed and rhubarb seed. The following quantities were sent out to applicants:—

Seedling trees and shrubs, packages	643
Potatoes in 3-pound bags	128
Wheat in 3-pound bags	134
Oats in 3-pound bags	166
Barley in 3-pound bags	60
Pease in 3-pound bags	49
Maple seed in 1-pound bags	77
Grass seed, one pound bags	22
Rhubarb seed, packages	33

SUMMARY OF REPORTS RECEIVED FROM FARMERS SUPPLIED WITH GRAIN, &c.

Number reporting on their experience with				oats	40
"	"	"	"	potatoes	30
"	"	"	"	barley	17
"	"	"	"	wheat	10
"	"	"	"	pease	13
				Variety.	
Largest yield obtained from	3	lbs.	wheat	(Red Fife)	136
"	"	"	3	" oats (Banner)	181
"	"	"	3	" barley (Odessa)	120
"	"	"	3	" pease (Paragon)	120
"	"	"	3	" potatoes (Lizzie's Pride)	290

SAMPLES FOR EXHIBITION PURPOSES.

A number of exhibits have been prepared and forwarded to England for two exhibitions held there during the past summer, an exhibit has also been prepared for the Universal Exposition to be held in Liege, Belgium, next year.

As usual exhibits were made at the Brandon Agricultural and Horticultural shows.

The Department of the Interior was also supplied with a large quantity of grain and grasses for the use of their immigration offices.

FARMERS' MEETINGS.

The farmers' meetings attended by me during the year had much larger audiences than usual, and the interest in the work of the experimental farms has in no wise abated.

During the year meetings were attended and addresses given at the following places:—

Blythe, December 14, 1903.
Brandon, January 16, 1904.
Morris, January 29, 1904.
Bradwardine, February 5, 1904.
Minnedosa, February 11, 1904.
Brandon, February 18, 1904.
Winnipeg, February 24 to 26, 1904.
Oak Lake, March 3, 1904.

VISITORS.

Owing to the Assiniboine river overflowing its banks, the road to the farm was impassable for some weeks in the spring, and as a consequence the number of visitors this year was not as large as usual, about 7,350 persons visited the farm during the year, as compared with 12,000 during 1902-3.

METEOROLOGICAL TABLES.

Months.	Highest temperature.		Lowest temperature.		Total rainfall.	Total snowfall.	Total amount of sunshine.
1903.	Day.	Deg.	Day.	Deg.	Inches.	Inches.	Hours.
December	2	38	13	−32		11	76·9
1904.							
January	7	34	24	−43		8	103·1
February	27	35	8	−39		27	130·2
March	6	33	2	−9		43	136·0
April	30	77	15	9	1·72	6	186·4
May	28	78	14	24	1·02		261·7
June	16	83	6	26	3·24		235·8
July	23	84	6	36	1·76		299·1
August	11	88	7	36	2·21		228·9
September	7	77	26	26	·82		151·2
October	11	69	5	15	·42		135·6
November	2	67	30	11		3	140·8
					11·19	98	2,081·8

CORRESPONDENCE.

The amount of correspondence shows a rapid increase this year, as 5,300 letters were received and 3,528 despatched, irrespective of circulars sent out.

I have the honour to be, sir,
Your obedient servant,

S. A. BEDFORD,
Superintendent.

EXPERIMENTAL FARM FOR THE NORTH-WEST TERRITORIES.

REPORT OF ANGUS MACKAY, SUPERINTENDENT.

EXPERIMENTAL FARM, INDIAN HEAD, N.W.T.,
November 30, 1904.

DR. WM. SAUNDERS,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit to you the seventeenth annual report of the operations of the Experimental Farm for the North-west Territories at Indian Head, Assiniboia, during the year 1904.

The past season, for grain growers throughout the Territories, has been a success in many districts, while in others it has been very disappointing.

The winter was exceptionally fine up to the middle of January, when cold weather set in and continued up to April, with heavy falls of snow.

Seeding started late in April, and the soil being wet, very little was sown before the first week in May. Fine weather continued throughout May, and grain all came up evenly, and never made a more promising start; in fact, on well cultivated farms the growth early in June was too rank, and required a set-back for profitable returns. This set-back came in the form of dry, hot weather from June 10 to July 13, when a general rain set in and relieved all fears for the crop so far as moisture was concerned.

Wheat harvest commenced the last week in August, but was not general till September 1, and in many districts frost came on the night of September 10 while considerable grain was still standing, although in all districts the large bulk was in stook.

Drizzling rain retarded harvest work considerably, and continued up to the second week in October, when fine threshing weather set in, and from then to November 23 nothing could excel the wonderfully fine weather experienced throughout the whole of the Territories.

CROPS ON THE EXPERIMENTAL FARM.

The crops on the experimental farm have seldom been better, more uniform, of better quality, or more easily secured than during the past season.

Leaving out a few of the varieties tested, which will be referred to when reached, the returns have been very satisfactory, and the quality above the average.

In no case was the straw as heavy or long as in many previous years, and in only a few places was the grain lodged, or down in the least. The heads, however, were both large and well filled.

Rust, which did injury in parts of Manitoba, did not reach the dangerous stage in the Territories before the grain was ready to cut. On the experimental farm practically no harm was done. While rust appeared on the leaves of the wheat, the grain was too far advanced for the crop to be injured.

Wheat, oats and barley were all in stook when frost visited the country on the night of September 10. Pease were in a good many cases not ripe, and were more or less injured. The yields of all varieties were good, however.

EXPERIMENTS WITH WHEAT.

Thirty-six varieties were tested on 1-20 acre plots. In no case was the straw heavy, while in many sorts it was light. All were sown by hoe drill on April 29 on fallowed land; 1½ bushels seed was sown per acre, the soil being clay loam.

Preston was the first plot sown and among the first cut, and in this, as well as in the field tests, it was in stook before Red Fife was ripe, though the varieties were sown within a few hours of each other.

In this test Preston was cut on August 24 and Red Fife on September 6, a difference of thirteen days in favour of the former.

SPRING WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.
1	Monarch	Aug. 31	124	40	Strong	3½	Bald	3,540	50	20	63½
2	Advance	" 31	124	36	"	3¼	"	3,480	49	45	59
3	White Russian	Sept. 3	127	37	"	3½	"	2,590	48	50	60½
4	Power's Fife (Minn. 149)	" 5	129	41	"	3½	"	2,320	48	40	63½
4	McKendry's Fife (Minn. 181)	" 8	132	36	"	4	"	3,360	45	30	62¾
6	Minnesota, No. 163	" 6	130	36	"	3½	"	4,120	45	20	62½
7	Australian, No. 19	" 7	131	37	"	3¼	"	4,640	44	20	62
8	Red Fife	" 6	130	36	"	3½	"	3,900	43	5	62½
9	Laurel	" 5	129	42	"	3½	"	3,780	42	50	62
10	Wellman's Fife	" 6	130	37	"	3¼	"	4,900	42	50	62½
11	Stanley	Aug. 25	118	36	"	3½	"	2,515	42	25	64
12	Benton	" 25	118	34	"	3	"	3,445	42	15	63
13	Clyde	Sept. 1	125	40	"	3¼	"	3,210	41	50	62
14	Australian, No. 9	Aug. 31	124	38	"	3	"	3,600	41	40	63½
15	Chester	" 27	120	33	"	3¼	"	2,620	41	10	65½
16	Percy	" 27	120	39	"	3½	"	3,295	41	5	63
17	Weldon	Sept. 5	129	38	"	3⅝	"	2,860	40	20	63¾
18	Countess	Aug. 25	118	35	"	2½	"	3,095	40	5	63
19	Hayne's Blue Stem (Minn. 169)	Sept. 8	132	41	"	3½	"	3,600	40	—	60½
20	Preston	Aug. 24	117	36	"	3½	Bearded	3,600	39	40	65
21	Red Fern	" 31	124	37	"	4	"	2,955	38	45	64½
22	White Fife	Sept. 6	130	37	"	3¼	Bald	4,020	38	40	63½
23	Admiral	Aug. 25	118	35	"	3	Bearded	2,330	38	10	64½
24	Huron	" 25	118	35	"	3½	"	2,455	36	5	64
25	Early Riga	" 20	113	28	"	2½	Bald	2,515	35	45	62
26	Dawn	" 24	117	28	"	3	"	2,335	34	25	65
27	Byron	" 22	115	32	"	3	Bearded	2,175	33	5	65¼
28	Rio Grande	Sept. 3	127	37	"	3½	"	3,400	32	45	64¼
29	Hastings	Aug. 25	118	33	"	2½	Bald	2,050	32	20	64
30	Pringle's Champlain	Sept. 3	127	36	"	3¼	Bearded	2,460	31	25	64¾
31	Colorado	Aug. 28	121	33	"	2½	"	3,160	31	5	65
32	Crawford	" 25	118	31	"	2½	Bald	2,400	30	—	64
33	Hungarian	" 31	124	33	"	2¾	Bearded	2,860	29	50	64
34	Herisson Bearded	Sept. 3	127	34	"	1¾	"	2,960	28	55	66
35	Plumper	Aug. 31	124	31	"	3	"	2,530	27	50	63½
36	Fraser	" 25	118	30	"	2½	"	1,885	27	35	65

TEST OF VARIETIES IN FIELD LOTS.

In this test eight sorts were used. Red Fife, Preston, Stanley and Percy were sown on new land which had been fallowed; Red Fife, Laurel, Wellman's Fife, White Fife and Huron were on old land fallowed previous year. All were sown by hoe drill at the rate of 1½ bushels per acre.

In this test Huron heads the list in yield, as it has done in the past three years under the same conditions, and as Huron is equal to Red Fife or Preston in milling

qualities, and, like Preston, is earlier than Red Fife, it is worthy of trial in many sections of country.

Like Preston, Huron is a cross-bred variety, White Fife and Ladoga being the parents. Preston's parents were Red Fife and Ladoga.

Number.	Name of Variety.	Character of Soil.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per Bushel.
			Acres				Inches		Inches		Bush.	Lbs.	Lbs.
1	Huron, Old land	Clay loam.	2	May 4	Aug. 30	118	38	Strong....	3¼	Bearded	42	47	63
2	White Fife "	"	2	" 4	Sept. 9	128	43	"	3¾	Bald ...	42	39	61½
3	Laurel "	"	6	April 30	" 7	130	44	Medium .	4	" . .	41	30	62
4	Wellman's Fife "	"	3	May 4	" 8	127	45	Strong. .	4	" ...	41	4	63
5	Red Fife "	"	10	" 2	" 8	129	42	"	3½	" ...	40	57	63½
6	Red Fife, Newland	"	5	April 29	" 5	129	37	" .. .	3¾	" ...	39	35	62½
7	Stanley "	"	5	" 30	Aug. 28	120	44	"	3½	" ...	38	20	60
8	Preston "	"	7	" 28	" 26	120	37	"	3½	Pearded	38	..	63½
9	Percy "	"	4	" 30	" 30	122	36	"	3	Bald ...	31	22	63½

WHEAT—FIELD LOTS.

Number.	Variety.	Cultivation.	Acres.	Yield per Acre.		Total Yield.	
				Bush.	Lbs.	Bush.	Lbs.
1	Huron	Fallow..	2	42	47	85	34
2	White Fife	"	2	42	30	85	..
3	Laurel	"	6	41	30	249	..
4	Wellman's Fife	"	3	41	4	123	12
5	Red Fife	"	10	40	57	409	30
6	Red Fife	"	5	39	35	197	55
7	Stanley	"	5	38	20	191	40
8	Preston	"	7	38	..	266	..
9	Percy	"	4	31	22	125	28
			44			1,733	19

Or an average of 39 bushels, 23 lbs. per acre.

COMPARISON OF FIELD LOTS OF WHEAT FOR THE LAST FOUR YEARS.

In view of the large demand for an early maturing variety of wheat, I give the date of seeding and ripening, time to mature and yield of four early and two late varieties. The six sorts have been grown in field lots each year under the same conditions with exception of seeding, which on account of weather could not all be done on the same date. Preston, Stanley and Huron mature in practically the same number of days.

Variety.	—	1901.			1902.			1903.			1904.			Average No. of days to mature.	Days less than Red Fife.	Average Yield.	
		—	Yield.		—	Yield.		—	Yield.		—	Yield.					
			Bush.	Lbs.		Bush.	Lbs.		Bush.	Lbs.		Bush.	Lbs.			Bush.	Lbs.
Red Fife	Sown	May 2	48	..	April 14	38	30	April 9	35	49	April 29	39	35	131¾	.....	40	20
	Ripe	Aug. 27	..	..	Aug. 25	..	..	Sept. 4	..	..	Sept. 5	..	..	.....	.....	..	..
	Days	117	..	..	133	..	..	148	..	..	129	..	..	.....	.....	..	..
Preston (Red Fife and Ladoga)	Sown	May 4	45	45	April 17	29	..	April 14	38	..	April 28	38	..	122	9¾	37	41
	Ripe	Aug. 16	..	..	Aug. 22	..	..	Aug. 29	..	..	Aug. 26	..	..	.....	.....	..	..
	Days	104	..	..	127	..	..	137	..	..	120	..	..	.....	.....	..	..
Stanley (Red Fife and Ladoga)	Sown	May 6	40	45	April 17	34	..	April 14	37	18	April 30	38	20	121	10¾	37	35
	Ripe	Aug. 16	..	..	Aug. 20	..	..	Aug. 29	..	..	Aug. 28	..	..	.....	.....	..	..
	Days	102	..	..	125	..	..	137	..	..	120	..	..	.....	.....	..	..
Percy (White Fife and Ladoga)	Sown	May 3	36	18	April 16	32	30	April 14	30	18	April 30	31	22	124½	7¼	32	37
	Ripe	Aug. 20	..	..	Aug. 22	..	..	Aug. 31	..	..	Aug. 30	..	..	.....	.....	..	..
	Days	109	..	..	128	..	..	139	..	..	122	..	..	.....	.....	..	..
Huron (White Fife and Ladoga)	Sown	May 4	45	..	May 6	39	20	April 16	40	24	May 4	42	47	119¼	12½	41	52
	Ripe	Aug. 22	..	..	Aug. 26	..	..	Aug. 31	..	..	Aug. 30	..	..	.....	.....	..	..
	Days	110	..	..	112	..	..	137	..	..	118	..	..	.....	.....	..	..
Wellman's Fife	Sown	May 2	39	20	April 30	36	..	April 9	35	10	May 4	41	4	128¼	3½	37	53
	Ripe	Aug. 23	..	..	Aug. 30	..	..	Sept. 7	..	..	Sept. 8	..	..	.....	.....	..	..
	Days	113	..	..	122	..	..	151	..	..	127	..	..	.....	.....	..	..

FOUR YEARS TEST OF FALLOW AGAINST STUBBLE FOR GROWING WHEAT

In this test Red Fife wheat was used.

Cultivation.	1901.		1902.		1903.		1904.	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Fallow	49		32	40	35	40	40	57
Stubble	38	32	25	..	16	..	31	28
Difference	10	8	7	40	19	40	9	29

Difference in four years in favour of fallow, 47 bushels 6 lbs.
Or an average of 11 bushels 46 lbs. per year.

SPRING WHEAT.

TEST OF FERTILIZERS.

Six plots of 1-40 acre each were sown on May 16 with Red Fife wheat, with hoe drill, at the rate of 1½ bushels per acre.

Although very little difference could be seen in the growth of straw, there was considerable variation in both straw and grain when threshed. The land was fallowed the previous year, the soil being clay loam.

SPRING WHEAT—TEST OF FERTILIZERS.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.	
			In.		In.	Lbs.	Bush.	Lbs.
Plot No. 1—Nitrate of soda, 100 lbs. per acre, half sown when grain was 2 in. high, balance when 6 in. high	Sept. 9.	116	46	Strong	3½	3,040	28	40
Plot No. 2—Nitrate of soda, 200 lbs. per acre, half sown when grain was 2 in. high, balance when 6 in. high	" 9	116	46	"	3¾	2,640	23	..
Plot No. 3—Superphosphate No. 1, 400 lbs. per acre, sown before grain and harrowed	" 9	116	44	"	3½	3,100	29	20
Plot No. 4—Check plot, unfertilized	" 9	116	45	"	3½	2,860	26	20
Plot No. 5—Muriate of potash, 200 lbs. per acre, sown before grain and harrowed	" 9	116	44	"	3¼	3,160	29	..
Plot No. 6—Superphosphate No. 1, 200 lbs. per acre; muriate of potash, 100 lbs. per acre; nitrate of soda, 100 lbs. per acre (half sown before grain and harrowed, balance when the grain was 2 in. high	" 9	116	45	"	3¾	3,280	31	40

COMPARISON OF RESULTS FOR THREE YEARS OF FERTILIZER TEST.

No. of Plot.	1901.		1902.		1903.		1904.		Average for 3 years.	
	Bush.	Lbs.	Bush.	Lbs.			Bush.	Lbs.	Bush.	Lbs.
Plot No. 1	61	20	28	..	Rusted	.....	28	40	39	20
Plot No. 2	58	40	39	40	"	.....	23	..	37	27
Plot No. 3	52	..	26	40	"	.....	29	20	36	..
Plot No. 4 (untreated)	62	40	29	20	"	.....	26	20	39	27
Plot No. 5	65	20	30	40	"	.....	29	..	41	40
Plot No. 6	65	20	32	..	"	.....	31	40	43	..

On account of all the plots being destroyed by rust in 1903, comparison can only be made for the three years. From these it will be seen that plot No. 6 (treated with superphosphate No. 1, muriate of potash and nitrate of soda) gave the best results.

SMUT TEST.

Three plots of Red Fife wheat were sown in this test—one untreated, one treated with bluestone at the rate of 1 lb. to 10 bushels of seed, and one treated with formalin, 6 oz. formalin to 10 bushels of seed, 10 gallons of water being used in each case. The seed treated with bluestone was dipped one minute; that with formaline 5 minutes.

Not a single head of smut was found in either of the three plots, showing that the season was not favourable to smut.

TEST OF EMMER AND SPELT.

Two varieties of Emmer and two of Spelt were sown on one-fortieth acre plots, by hoe drill, on fallowed land, clay loam, and Common Emmer was also sown on one acre lot. It will be noticed that in yield of both straw and grain, the Common Emmer gave much the best results.

EMMER AND SPELT—TEST OF VARIETIES.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.
				In.		In.		Lbs.	Lbs.
Common Emmer	May 14.	Sept. 9.	118	42	Medium	2	Bearded..	5,580	3,100
White Spelt	" 14.	" 14.	123	46	Strong..	4½	Bald	2,660	1,720
Red Emmer	" 14.	" 12.	121	51	" ..	3	Bearded..	1,540	1,520
Red Spelt	" 14.	" 14.	123	55	" ..	4¼	Bald	1,200	1,120
Common Emmer (field lot)	" 17.	" 13.	119	36	Medium	2¾	Bearded..	.....	2,744

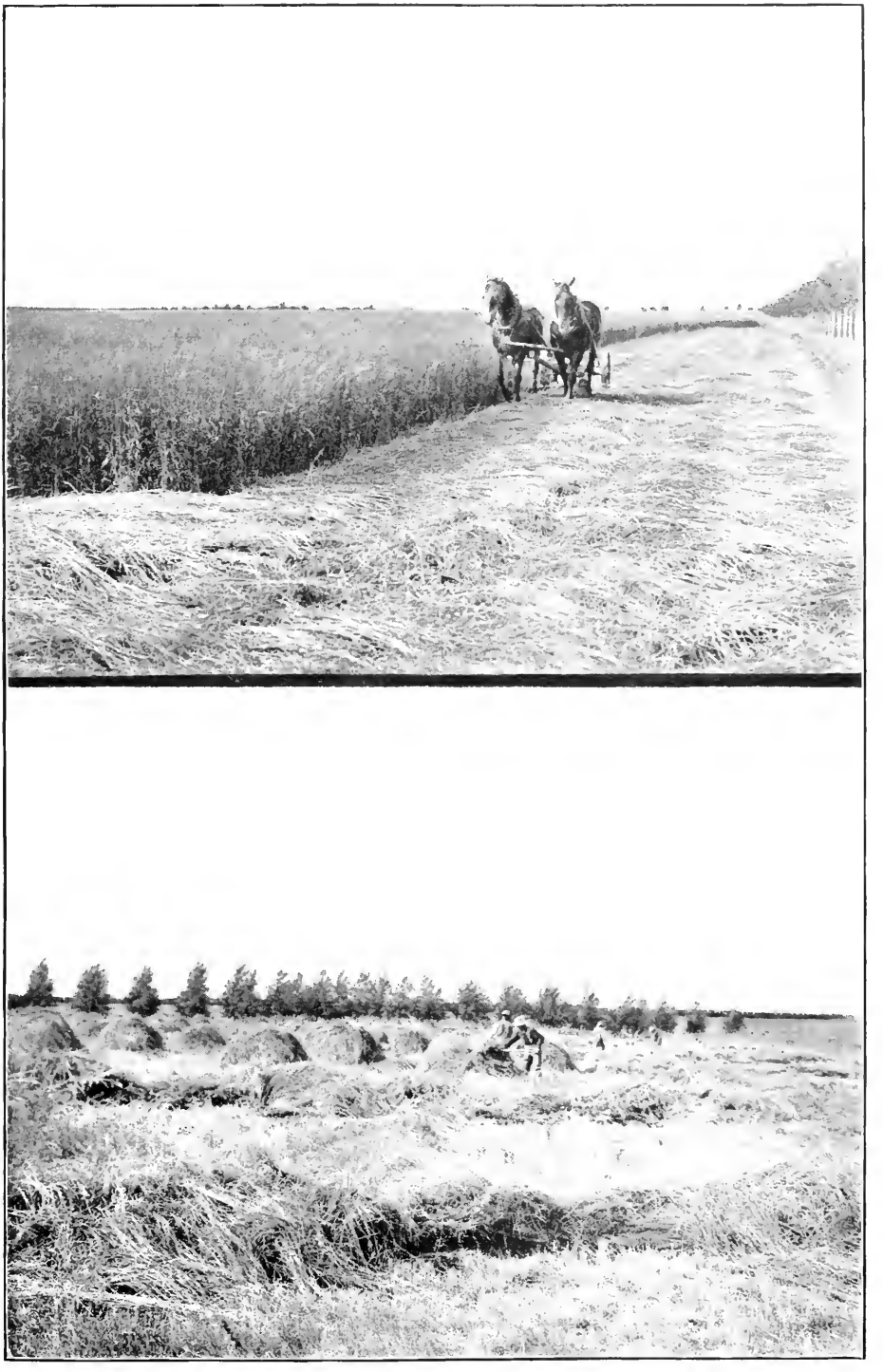
MACARONI WHEAT—TEST OF VARIETIES.

Four varieties were sown on plots of 1-20 acre each, fallowed land, clay loam. All gave good yields. The straw of the Goose wheat was weak and lodged considerably.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.	Weight per Bushel.
				In.		In.		Lbs.	Bush. Lbs.	Lbs
1 Roumanian	April 29	Sept. 5.	129	44	Strong..	3	Bearded	3,850	47 50	65
2 Mahmoudi	" 29	" 3.	127	39	" ..	2½	"	2,910	43 20	62½
3 Goose	" 29	Aug. 31.	124	38	" ..	2¼	"	3,655	43 5	64
4 Yellow Gharnovka	" 29	Sept. 5.	129	39	" ..	2¾	"	4,655	41 45	64

SUMMER FALLOWS.

In view of the great importance of properly preparing land for crops, and of the large number of new settlers coming into the country, I make no excuse for repeating



Cutting Western Rye Grass. Cocking Brome Hay.
Experimental Farm, Indian Head, N.W.T.

what was said in my last two reports respecting summer-fallows, and breaking up and cultivating new prairie land.

It is very gratifying to know that throughout the Territories, summer-fallowing is rapidly becoming general. No matter where farming is carried on, the farmers realize that to be sure of a crop they must prepare a portion of their land the year before the crop is grown, and apart from the value of the stored moisture, there is the inestimable advantage of keeping weeds from overrunning the farm.

The true worth of properly prepared fallows has been clearly demonstrated in past years in every grain-growing district of Assiniboia.

The work of preparing land for crop by fallowing is carried on in so many ways in different parts of the Territories, that perhaps a few words on some of the methods employed may be of help to at least some of the new settlers.

It has been observed in Alberta and Saskatchewan that the land to be fallowed is not, as a rule, touched until the weeds are full grown and in many cases, bearing fully matured seed. It is then ploughed.

By this method, which, no doubt, saves work at the time, the very object of a summer-fallow is defeated. In the first place, moisture is not conserved because the land has been pumped dry by the heavy growth of weeds; and, secondly, instead of using the summer-fallow as a means of eradicating weeds, a foundation is laid for years of labour and expense by the myriads of foul seeds turned under.

The endless fields of yellow-flowered weeds, generally Ball Mustard (*Neslia paniculata*), testify to the indifferent work done in many districts, and while no weed is more easily eradicated by a good system of fallows, there is no weed that is more easily propagated or takes greater advantage of poor work on fallows or of fall or spring cultivation.

As has been pointed out in my previous reports, early and thorough work on fallows is absolutely necessary to success, and I here repeat the methods and results of tests carried on for some years past.

First Method.—Ploughed deep (6 to 8 inches) before last of June; surface cultivated during the growing season, and just before or immediately after harvest ploughed 5 or 6 inches deep.

Result.—Too much late growth if season was at all wet; grain late in ripening, and a large crop of weeds if the grain was in any way injured by winds.

Second Method.—Ploughed shallow (3 inches deep) before the last of June; surface cultivated during the growing season, and ploughed shallow (3 to 4 inches deep) in the autumn.

Result.—Poor crop in a dry year; medium crop in a wet year. Not sufficiently stirred to enable soil to retain the moisture.

Third Method.—Ploughed shallow (3 inches) before the last of June; surface cultivated during the growing season, and ploughed deep (7 to 8 inches) in the autumn.

Result.—Soil too loose and does not retain moisture. Crop light and weedy in a dry year.

Fourth Method.—Ploughed deep (7 to 8 inches) before the last of June; surface cultivated during the growing season.

Result.—Sufficient moisture conserved for a dry year, and not too much for a wet one. Few or no weeds, as all the seeds near the surface have germinated and been killed. Surface soil apt to blow more readily than when either of the other methods is followed. For the past fourteen years, the best, safest and cleanest grain has been grown on fallow worked in this way, and the method is therefore recommended.

Fallows that have been ploughed for the first time after the first of July, and especially after July 15, have never given good results ; and the plan too frequently followed of waiting till weeds are full grown, and often ripe, and ploughing under with the idea of enriching the soil, is a method that cannot be too earnestly advised against.

In the first place, after the rains are over in June or early in July, as they usually are, no amount of work, whether deep or shallow ploughing, or surface cultivation, can put moisture in the soil. The rain must fall on the first ploughing and be conserved by surface cultivation.

Weeds, when allowed to attain their full growth, take from the soil all the moisture put there by the June rains, and ploughing under weeds with their seeds ripe or nearly so, is adding a thousand-fold to the myriads already in the soil, and does not materially enrich the land.

BREAKING AND BACK-SETTING.

In view of the fact that every year brings to the Territories many new settlers, who are unacquainted with the methods of breaking up and preparing new land for crop, a few suggestions with regard to this very important work may not be amiss.

In all sections where the sod is thick and tough, breaking and back-setting should be done ; while in districts where scrub abounds and the sod is thin, deep breaking is all that is necessary.

The former is generally applicable to Assiniboia, and the latter to Alberta and Saskatchewan, especially to the northern parts of these Territories where the land is more or less scrubby.

SHALLOW-BREAKING.

(To be back-set.)

The sod should be turned over as thin as possible, and for this purpose a walking plough with a 12 or 14-inch share, is the best. When the breaking is completed (which should not be later than the second week in July), rolling will hasten the rotting process and permit back-setting to commence early in August.

BACK-SETTING.

Back-setting is merely turning the sod back to its original place, and at the same time bringing up two or three inches of fresh soil to cover it. The ploughing should be done in the same direction as the breaking and the same width of furrow turned. Two inches below the breaking is considered deep enough, but three to four inches will give better results.

After back-setting, the soil cannot be made too fine, and the use of disc or Randall harrow to cut up every piece of unrotted sod, will complete the work.

DEEP BREAKING.

Deep breaking, which in many sections of the country is the only practicable way of preparing new land, and which is, unfortunately, done in some instances where breaking and back-setting would give more satisfactory results, consists in the turning over of the sod as deeply as possible; usually from four to five inches.

When the sod has rotted, the top soil should be worked and made as fine as possible. The use of harrow and disc will fill up all irregularities on the surface, and make a fine, even seed-bed.

Whether the land is broken shallow or deep, it is necessary to have the work completed early, so as to take advantage of the rains which usually come during June or early in July. These rains cause the sod to rot, and without them, or if the ploughing is done after they are over, the sod remains in the same condition as when turned, and no amount of work will make up for the loss.

To some districts near the foot-hills of the mountains and in districts where scrub abounds and the sod is thin, these remarks may not apply; but as a rule, throughout the Territories, early breaking, whether deep or shallow, is advisable.

WORKING LAND AFTER FIRST CROP.

Inquiries are often made as to what should be done after taking off the first crop on new land, the question being as to whether the land should be ploughed, or cultivated, or sown without any cultivation whatever.

This, however, can only be determined by circumstances. In districts with heavy clay soil, a satisfactory crop may be expected from burning the stubble of the former crop and sowing with or without cultivation; although a shallow cultivation after the stubble is burnt usually gives the best results.

In districts with light soils and especially with gravelly subsoil, cultivation before seeding is necessary.

After taking the second crop from breaking or back-setting, there can be no doubt that the land should be well fallowed to put it in proper condition for succeeding crops. If the fallow is well made and the process repeated every third year, the settler will have started on the right road to future success.

SMUT.

On account of many new settlers coming into the country each year that can have no idea of the prevalence of smut, especially in the wheat crop, and the serious loss caused by this fungous disease, I submit the results obtained during the past years on this farm for their guidance.

Bunt or stinking smut in wheat is a fungous disease that attacks the grain more or less each year, and where at all bad, the crop is rendered unsaleable, and with only a few heads affected, if threshed in damp weather, the grade and price are reduced. No district is proof against smut, and though more prevalent in some seasons than others, it is wise to guard against all danger from this source each year. Three remedies have been tried repeatedly; these are, treating the seed with Bluestone (Copper Sulphate), with Formalin and with Massel powder. Bluestone, from cheapness, ease in application and effectual cure, has proven the best for wheat, while formalin has given the best results with smut in oats and barley. While formalin is not more expensive than bluestone, the application is more difficult in the seed having to be soaked longer.

For wheat apparently free from smut, 1 pound of bluestone crushed and dissolved in warm water and mixed with 10 gallons water, and the seed sprinkled with, or dipped in the solution, is sufficient for 10 bushels. For wheat at all affected, 1 pound bluestone to 5 bushels seed is required. The seed can be sprinkled or dipped as is most convenient, but, in sprinkling, care must be taken that every grain is wet with the solution.

For smut in oats or barley, 1 pound of formalin (which is a liquid), is sufficient for 50 bushels seed. If the seed is smutty the solution should be 8 or 9 ounces formalin to 10 gallons of water; if not smutty, 4½ ounces to the same quantity of water.

The seed should be soaked from 5 minutes to 2 hours, according to condition of grain and strength of solution.

EXPERIMENTS WITH OATS.

The yield of all varieties in both uniform plots and field lots, while not as high as in former years, was quite satisfactory. As will be seen, Banner again heads the list in both tests. The dry spell in June and first week in July reduced the yield considerably.

OATS—TEST OF VARIETIES.

Forty-two varieties were sown on May 7, on 1-20 acre plots (excepting three, which were on 1-40 acre), by hoe drill at the rate of two bushels per acre. The soil was clay loam, fallowed during the preceding season. In all the early ripening varieties the yield was reduced by blackbirds, both before being cut and while in stook.

Number.	Name of Variety.	Size of Plot.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
		Ac.			In.		In.		Lbs.	Bush.	Lbs.	
1	Banner	1/20	Aug. 26.	111	42	Strong..	8	Branching..	2,820	123	28	41
2	Irish Victor	1/20	" 27.	112	44	" ..	8	" ..	4,400	102	17	41½
3	Golden Tartarian	1/20	Sept. 3.	119	42	" ..	9	Sided.....	4,740	101	26	38½
4	Waverley..	1/20	Aug. 27.	112	50	" .	8	Branching..	4,960	101	21	42¼
5	Milford Black.	1/20	Sept. 2.	118	45	" ..	8	Sided.....	4,480	101	13	38½
6	Danish Island	1/20	Aug. 27.	112	45	" ..	8	Branching..	3,740	98	28	41½
7	Kendal White	1/20	" 27.	112	42	" ..	8	" ..	5,040	98	28	41
8	Golden Giant	1/20	Sept. 3.	119	47	" ..	9	Sided.....	4,820	98	28	36
9	Pioneer	1/40	Aug. 20.	105	42	" ..	8	Branching..	5,440	98	18	39½
10	Goldfinder	1/20	" 29.	114	41	" ..	8	" ..	3,440	97	22	38
11	White Giant	1/20	" 26.	111	42	" ..	7	" ..	4,280	97	2	41
12	American Triumph	1/20	" 28.	113	40	" ..	7	" ..	2,320	95	30	40½
13	Columbus	1/20	" 28.	113	40	" ..	8	" ..	2,000	94	19	37½
14	Abundance	1/20	" 27.	112	45	" ..	9	" ..	4,420	93	23	41
15	Storm King	1/20	" 28.	113	41	" ..	8	Sided.....	6,220	93	19	39
16	Golden Beauty..	1/20	" 27.	112	41	" ..	8	Branching..	4,040	93	3	41
17	Pense Black	1/20	Sept. 2.	118	46	" .	8	Sided.....	5,800	92	21	38½
18	Milford White	1/20	Aug. 28.	113	44	" ..	10	"	4,320	90	20	42
19	Olive Black	1/20	Sept. 2.	118	47	" ..	8	"	5,320	89	32	40
20	Twentieth Century	1/20	Aug. 25.	110	45	" ..	7	Branching.	4,620	89	14	41½
21	Scotch Potato	1/20	" 28.	113	45	" ..	8	" ..	4,120	87	22	40
22	Pense White	1/20	" 29.	114	43	" ..	8	Sided.....	6,220	87	2	40
23	American Beauty	1/20	" 27.	112	42	" ..	7	Branching..	3,940	86	11	42
24	Kendal Black	1/20	Sept. 2.	118	44	" ..	8	Sided.....	4,020	84	4	40
25	Bavarian	1/20	Aug. 27.	112	40	" ..	7	Branching..	3,440	83	18	39½
26	Siberian	1/20	" 28.	113	50	" ..	10	Sided.....	5,320	82	12	38
27	Golden Fleece	1/20	Sept. 1.	117	45	" ..	8	Branching..	6,000	82	7	40
28	Swedish Select	1/20	Aug. 23	108	41	" ..	7	" ..	5,580	80	30	42
29	Improved Ligowo	1/20	" 25.	110	42	" ..	7	" ..	4,100	80	15	43
30	Sensation	1/20	" 22.	107	41	" ..	8	Sided.....	2,720	80	5	44
31	Joanette	1/20	Sept. 3.	119	35	" ..	8	Branching..	4,380	79	14	35½
32	Early Golden Prolific..	1/20	Aug. 27.	112	44	" ..	8	" ..	3,240	78	28	40½
33	Holstein Prolific	1/20	" 27.	112	42	" ..	8	" ..	2,380	78	13	40
34	Improved American.	1/20	" 27.	112	43	" ..	9	" ..	4,520	76	1	40½
35	*Black Beauty	1/20	" 20.	105	43	" ..	7	" ..	4,500	75	30	36½
36	Lincoln	1/20	" 28.	113	41	" ..	7	" ..	4,680	75	25	42
37	*Wide Awake	1/20	" 27.	112	41	" ..	8	" ..	3,320	75	5	43
38	*Thousand Dollar	1/20	" 22.	107	43	" ..	7	" ..	4,600	73	3	41½
39	*Mennonite	1/20	" 22.	107	47	" .	8	" ..	4,000	71	26	39
40	*Buckbee's Illinois	1/20	" 23.	108	46	" ..	8	" ..	4,400	71	6	40
41	*Olive White	1/20	" 22.	107	46	" ..	8	Sided.....	2,040	69	26	39¾
42	*Tartar King	1/40	" 24.	109	45	" ..	8	"	3,650	69	..	38½

*The plots of these varieties were badly eaten by blackbirds, both before and after being cut.

OATS—FIELD LOTS.

Nine varieties were sown from May 6 to 13, by hoe drill, at the rate of two bushels per acre. Soil, clay loam, fallowed. Banner oats were also sown on Brome sod, broken and back-set the previous year after a crop of hay had been taken off.

The effects of the dry, hot weather were realized when the binders started. The field of 50 acres, in which six of the nine sorts were sown, was surrounded by hedges, and for 100 feet inside these the straw was much heavier, caused by the large quantity of snow lodged there during the winter. Inside the wet belt the dry weather reduced the yield of straw, as well as of grain, very materially.

OATS.—FIELD LOTS.

Name of Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per Bushel.
	Acres.				In.		In.		Bush.	Lbs.	Lbs.
1 Banner	10	May 9	Aug. 26	109	43	Strong	8	Branching	85	24	38
2 Wide Awake	4½	" 12	Sept. 1	112	39	"	8½	"	85	21	42
3 Black Beauty	2½	" 13	" 3	113	35	"	8½	"	85	3	37½
4 Abundance	10	" 9	Aug. 27	110	43	"	8	"	77	5	41½
5 Banner	4	" 6	" 24	110	34	"	8	"	73	14	
6 Goldfinder	5	" 10	" 30	112	44	"	9	"	72	27	38
7 Improved Ligowo	5	" 12	Sept. 1	112	40	"	8½	"	72		41½
8 Thousand Dollar	5	" 10	Aug. 27	109	43	"	8	"	71	24	41
9 Tartar King	5	" 12	" 27	107	46	"	8½	Sided.	70	22	37½
10 Waverley	9	" 10	" 27	109	45	"	8	Branching	70	1	42½

OAT CROP AND AVERAGE YIELD.

Variety.	Cultivation.	Acres.	Yield per Acre.		Total Yield.	
			Bush.	Lbs.	Bush.	Lbs.
Banner	Fallow	10	85	24	857	2
Wide Awake	"	4½	85	24	385	9
Black Beauty	"	2½	85	3	212	24
Abundance	"	10	77	5	775	
Banner	Backsetting, Brome-sod	4	73	14	293	12
Goldfinder	Fallow	5	72	27	363	33
Improved Ligowo	"	5	72		360	
Thousand Dollar	"	5	71	24	358	18
Tartar King	"	5	70	22	353	8
Waverley	"	9	70	1	630	9
		60			4,589	23

Or an average of 76 bushels, 16 lbs. per acre.

COMPARISON OF FIELD LOTS OF OATS FOR LAST FOUR YEARS.

Date of ripening and yield of nine varieties of oats grown in field lots under the same conditions.

Variety.	1901.			1902.			1903.			1904.			Average.	
	Date ripe.	Bush.	Lbs.	Date ripe.	Bush.	Lbs.	Date ripe.	Bush.	Lbs.	Date ripe.	Bush.	Lbs.	Bush.	Lbs.
Banner	Aug. 19	117	..	Aug. 21	87	..	Aug. 25	119	2	Aug. 26	85	24	102	6
Abundance	" 22	124	20	" 23	80	..	" 29	106	..	" 27	77	5	96	32
Wide Awake	" 15	96	..	" 23	87	..	" 25	98	14	Sept. 1	85	21	91	17
Improved Ligowo	" 17	83	..	" 25	77	20	" 25	87	..	" 1	72	..	79	30
Thousand Dollar	" 23	92	4	Sept. 2	64	8	" 31	93	8	Aug. 27	71	24	80	11
Goldfinder	" 28	104	..	" 2	89	17	" 31	91	21	" 30	72	27	89	16
Tartar King	" 18	104	10	Aug. 20	85	..	" 22	86	12	" 27	70	22	86	16
Waverley	" 19	94	..	" 25	82	..	" 27	82	3	" 27	70	1	82	1
Black Beauty	" 19	93	..	Sept. 5	81	12	" 31	97	13	Sept. 3	85	3	89	7

FOUR YEARS TEST OF FALLOW AGAINST STUBBLE FOR GROWING OATS.

In this test Banner oats were used.

Cultivation.	1901.		1902.		1903.		1904.	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Fallow	117		87	..	119	2	85	24
Stubble	97	32	32	26	47	12	70	24
Difference	19	2	54	8	71	24	15	..

Difference in four years in favour of fallow, 160 bushels; or an average of 40 bushels per year.

OATS—SMUT TEST.

Three plots were sown in this test: (1) Treated with bluestone, 1 pound to 10 bushels of seed; (2) Formalin, 6 ounces to 10 bushels, and (3) untreated.

No smut could be found in either of the three plots.

EXPERIMENTS WITH BARLEY.

TEST OF VARIETIES.

This test consisted of 19 varieties of two-rowed and 20 varieties of six-rowed barley. All were sown on fallowed land. On May 14, by hoe drill, at the rate of two bushels of seed per acre. Soil, clay loam.

All varieties gave large yields, but were coloured by rains.

TWO ROWED BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	Number of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
				In.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	Standwell	Sept. 3	112	33	Strong	2½	3,610	67	9	52½
2	Invincible	" 3	112	35	"	3	3,835	67	4	53¼
3	Swedish Chevalier	" 1	110	34	"	3⅜	4,510	63	16	53⅝
4	Primus	Aug. 27	105	33	"	3	3,865	62	24	55
5	Princess	Sept. 6	115	34	"	3¼	3,029	60	20	54
6	Hannchen	Aug. 30	108	33	"	3	4,080	60	20	55
7	Danish Chevalier	Sept. 7	116	33	"	2⅜	3,260	59	8	51½
8	French Chevalier	" 7	116	32	"	4	3,200	58	16	51
9	Canadian Thorpe	Aug. 31	109	37	"	3	3,460	55	40	52
10	Fulton	" 20	98	35	"	2½	3,855	50	45	50¾
11	Beaver	Sept. 7	116	34	"	4	4,940	50	45	51
12	Gordon	Aug. 22	100	40	"	2½	2,345	49	23	50
13	Harvey	" 22	100	37	"	3	3,705	49	23	51½
14	Sidney	" 20	98	36	"	3½	2,830	48	46	53
15	Clifford	" 21	99	34	"	3¼	3,890	48	46	51½
16	Logan	" 22	100	40	"	3	4,915	47	29	51½
17	Dunham	" 23	101	32	"	3½	2,325	46	27	53
18	Jarvis	" 22	100	38	"	3⅜	3,685	46	27	51
19	Newton	Sept. 5	114	33	"	2½	4,420	49	..	51½

SIX-ROWED BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
				In.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	Nugent	Aug. 20.	98	29	Strong.	2¼	3,180	67	24	52
2	Claude	" 19.	97	34	"	2½	3,390	66	32	51½
3	Stella	" 20.	98	34	"	2½	3,160	65	20	53½
4	Argyle	" 17.	95	37	"	2¼	2,740	64	28	52½
5	Common	" 13.	91	30	"	2½	3,000	64	28	53
6	Yale	" 21.	99	34	"	3	4,120	64	8	52½
7	Odessa	" 16.	94	34	"	2	3,660	62	24	51
8	Rennie's Improved	" 16.	94	35	"	2¼	3,010	62	9	53½
9	Summit	" 19.	97	31	"	3½	3,830	61	42	53
10	Brome	" 19.	97	32	"	2¾	3,220	60	40	52
11	Baxter	" 16.	94	28	"	2	3,650	59	13	53
12	Royal	" 15.	93	32	"	2¾	2,760	58	26	51½
13	Oderbruch	" 14.	92	32	"	3	3,245	57	19	52½
14	Empire	" 19.	97	35	"	2½	3,800	57	4	53½
15	Mansfield	" 15.	93	33	"	2½	2,915	57	..	50½
16	Trooper	" 15.	93	34	"	2½	3,210	57	..	51½
17	Garfield	" 15.	93	35	"	2½	2,455	53	41	51½
18	Albert	" 15.	93	33	"	2¾	3,000	53	36	52½
19	Mensury	" 15.	93	37	"	2¼	2,710	53	26	49½
20	Champion	" 12.	90	33	"	2½	2,880	41	7	47½

BARLEY—FIELD LOTS.

In this test nine varieties were used, five of six-rowed and four of two-rowed sorts. Mensury, Odessa, Royal, Mansfield and Sidney were sown on fallow, by hoe drill, two bushels of seed per acre. Claude was sown on corn land, and Invincible, Standwell and Canadian Thorpe on Brome sod broken after a crop of hay was taken off, and back-set late in the fall. Soil, clay loam.

The dates of breaking and back-setting are given below, and show that to be successful early work is required.

Variety.	Broken.	Backset.
Invincible	4–8 July	17–20 August.
Canadian Thorpe	4–10 August	26–28 September.
Standwell	7–10 "	3–7 November.

Name of Variety.	Cultivation.	Size of Plot.	Date of Sowing.	Date of Ripen'g.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per Bushel.
						In.		In.		Bush.	Lbs.	Lbs.
1 Mansfield	Fallow	2¼	May 13.	Aug. 23.	102	28	Strong.	2½	Six-rowed	56	32	52½
2 Mensury	"	4	" 12.	" 22.	102	34	"	2¼	"	55	41	52
3 Royal	"	2	" 13.	" 20.	99	24	"	2½	"	55	25	52
4 Invincible	Backsetting, Brome-sod.	2¼	" 7.	" 25.	110	22	"	2½	Two-rowed	55	10	53½
5 Claude	Corn land	2½	" 7.	" 20.	105	30	"	3	Six-rowed	53	22	50
6 Odessa	Fallow	5½	" 13.	" 24.	103	28	"	2¼	"	53	18	52
7 Sidney	"	4½	" 16.	" 25.	101	33	"	3¼	Two-rowed	43	42	52
8 Canadian Thorpe	Backsetting, Brome-sod.	5	" 14.	" 26.	104	26	"	3	"	29		53
9 Standwell	"	6	" 14.	" 26.	104	24	"	2½	"	26	4	52

BARLEY CROP AND AVERAGE YIELD.

Variety.	Cultivation.	Acres.	Yield per Acre.		Total Yield.	
			Bush.	Lbs.	Bush.	Lbs.
Mansfield	Fallow	2¼	56	32	127	24
Mensury	"	4	55	41	223	20
Royal	"	2	55	25	111	2
Invincible	Backsetting, Brome-sod	2¼	55	10	124	10
Claude	Corn land	2½	53	22	133	31
Odessa	Fallow	5½	53	18	293	27
Sidney	"	4½	43	42	197	21
Canadian Thorpe	Backsetting, Brome-sod	5	29	..	145	..
Standwell	" "	6	26	4	156	24
		34			1,512	15

Or an average of 44 bushels and 23 lbs. per acre.

COMPARISON OF FIELD LOTS OF BARLEY FOR THE LAST FOUR YEARS.

Date of ripening and yield of nine varieties of barley grown in field lots under the same conditions.

Variety.	1901.			1902.			1903.			1904.			Average	
	Date ripe.	Bush.	Lbs.	Date ripe.	Bush.	Lbs.	Date ripe.	Bush.	Lbs.	Date ripe.	Bush.	Lbs.	Bush.	Lbs.
1. Mensury	Aug. 10	59	40	Aug. 24	*51	12	Aug. 12	56	12	Aug. 22	55	41	55	38
2. Odessa	" 11	58	40	" 24	*65	..	" 12	48	28	" 24	53	18	56	21
3. Mansfield	" 14	*57	4	" 24	*57	44	" 25	50	..	" 23	56	32	55	20
4. Royal	" 12	*63	16	Sept. 4	56	..	" 10	67	3	" 20	55	25	60	23
5. Claude	" 11	66	12	Aug. 26	*66	32	" 25	66	..	" 20	53	22	63	4
6. Invincible	" 22	49	32	Sept. 6	63	16	" 28	59	25	" 25	55	10	56	45
7. Standwell	" 22	48	16	" 6	49	24	" 25	63	20	" 26	26	4	46	40
8. Sidney	" 15	60	10	" 1	66	..	" 21	54	20	" 25	43	42	56	6
9. Canadian Thorpe	" 18	44	..	" 1	68	36	" 21	53	39	" 26	29	..	48	43

*These yields are from the uniform test plots, as there were no field lots of the varieties in the year in question.

FOUR YEARS TEST OF FALLOW AGAINST STUBBLE FOR GROWING BARLEY.

The same variety cannot be given for the four years, as different sorts of barley were sown on stubble each year:—

Variety Sown.	1901.		1902.		1903.		1904.	
	Sidney.		Rennie's Improved.		Canadian Thorpe.		Mensury.	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Fallow	60	10	51	..	53	39	55	41
Stubble	50	36	26	12	20	40	37	24
Difference	9	22	24	36	32	47	18	76

Difference in favour of Fallow in 4 years, 85 bushels 26 lbs.
Or an average of 21 bushels, 6 lbs per year.

BARLEY—SMUT TEST.

Bluestoned, Formalined and untreated seed was sown of barley, the same as in wheat and oats. The result was, no smut whatever, in either treated or untreated plots.

ROTATION OF CROPS.

The rotation test commenced in 1899 was continued the past year. As soon as crops were taken off in fall of 1903, each half acre was ploughed and harrowed. Before seeding in the spring the land was cultivated by cultivator or gang plow. Soil, clay loam. Sown at the rate of 1½ bushels of wheat, and 2 bushels of barley and oats per acre by hoe drill.

The leguminous crops were ploughed under as they obtained their best growth.

ROTATION CROPS.

The following rotation has been carried out since 1899 on half-acre plots. Since 1899, two rotations have been completed, the order of the plots in 1902, 1903 and 1904 being the same as in 1899, 1900 and 1901 respectively :—

No.	1899 and 1902.	1900 and 1903.	1901 and 1904.
1	Wheat	Oats	Soja Beans.
2	"	Wheat	Pease.
3	"	Oats	Tares.
4	"	Wheat	Red Clover.
5	"	Barley	Alsike and Lucern.
6	Pease	Wheat	Wheat.
7	Tares	"	Oats.
8	Soja Beans	"	"
9	Red Clover	"	Wheat.
10	Alsike and Lucern	"	Barley.
11	Rape	"	Summer-fallow.
12	Wheat	"	"
13	"	Oats	"
14	"	Barley	"
15	"	Wheat	Oats.
16	"	Barley	"
17	Oats	Soja Beans	Wheat.
18	Wheat	Pease	"
19	Oats	Tares	"
20	Wheat	Red Clover	"
21	Barley	Alsike and Lucern	"
22	Rye	Summer-fallow	"

ROTATION TEST.—Results obtained in 1904. Plots, ½ acre each. Soil, clay loam.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	
					In.		In.		Bush.	Lbs.
1	Soja Beans	May 18..		Ploughed under Aug. 6.						
2	Pease	" 18..			"	"	6.			
3	Tares	" 18..			"	"	Oct. 3.			
4	Red Clover	" 28..			"	"	3.			
5	Alsike and Lucern	" 28..			"	"	3.			
6	Wheat, Red Fife	" 4..	Sept. 5..	124	35	Strong	3	Bald	31	28
7	Oats, Banner	" 13..	" 1..	111	39	"	7	Branching	70	24
8	"	" 13..	" 1..	111	38	"	7	"	47	28
9	Wheat, Red Fife	" 3..	" 5..	125	35	"	2¾	Bald	29	2
10	Barley, Mensury	" 13..	Aug. 20..	99	30	"	2½	6-rowed	37	24
11	Summer-fallow									
12	"									
13	"									
14	"									
15	Oats, Banner	May 13..	Sept. 1..	111	44	Strong	7	Branching	82	14
16	"	" 13..	" 1..	111	36	"	7	"	50	20
17	Wheat, Red Fife	" 3..	" 5..	125	36	"	3¼	Bald	39	12
18	" "	" 3..	" 5..	125	38	"	3	"	36	8
19	" "	" 3..	" 5..	125	38	"	3	"	36	..
20	" "	" 3..	" 5..	125	37	"	3	"	32	6
21	" "	" 3..	" 5..	125	38	"	3	"	28	54
22	" "	" 3..	" 5..	125	40	"	3¾	"	36	..

EXPERIMENTS WITH PEASE.

Thirty-one varieties of pease were tested on one-twentieth acre plots, on fallowed land, sown by hoe drill, on May 16, at the rate of 2 bushels of small, 2½ bushels medium and 3 bushels of large pease per acre. Soil, clay loam.

While all varieties gave large yields, nearly all were late in maturing, caused by the moist weather in August. Nine varieties were badly injured by frost on the night of September 10, and eight others more or less injured, leaving 14 that matured properly.

In addition to the uniform plots, White Wonder and Arthur, two early, medium sized sorts were sown 1½ acres of the former and 2½ acres of the latter), on fallowed land by hoe drill on May 17. Both sorts were entirely ripe when frost came, and the yield and sample satisfactory.

TEST OF GARDEN PEASE IN FIELD PLOTS.

To ascertain the yield of garden pease sown by grain drill, 8 varieties were sown alongside the uniform test plots of field pease on May 16, on plots of one-twentieth acre. Champion of England being a very late variety, did not ripen before the frost came. All the others did so, giving good yields.

Following were the yields per acre :—

	Bush.	Lbs.
Laxton's Charmer	58	40
Horsford's Market Garden	52	40
American Wonder	50	
Stratagem	48	
Shropshire Hero	48	
Premium Gem	42	40
Champion of England	42	
Alaska	41	20

PEASE—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Size of Pea.	Yield per Acre. Bush.	Lbs.	Weight per Bushel. Lbs.
				In.	In.				
1 Picton	Sept. 9	116	Strong	60	2¼	Medium	68	20	58½
2 Prussian Blue	" 9	116	"	70	2	"	67		62½
3 Daniel O'Rourke	" 5	112	"	60	2½	Small	67		62½
4 Prince	" 10	118	"	55	2½	"	66		60½
5 Agnes	" 7	114	"	59	2¾	Large	65	20	61
6 Black Eyed Marrowfat	" 16	123	"	65	3	"	63	40	66½
7 Pride	" 10	117	"	55	2½	Small	63	20	59
8 Crown	" 4	111	"	55	2	"	62	40	61½
9 White Wonder	" 1	108	"	60	2½	Large	62	20	62
10 Archer	" 10	117	"	72	2½	Medium	61	40	52½
11 Arthur	" 8	115	"	55	2	Large	61	40	63
12 German White	" 10	117	"	55	2½	Medium	61	40	62½
13 Paragon	" 13	120	"	65	3	"	61	20	59
14 Chancellor	" 9	116	"	60	3	Small	59	20	63
15 Carleton	" 18	125	"	55	2	Medium	59		58½
16 English Grey	" 11	118	"	66	2¼	Large	58	20	53½
17 Pearl	" 11	118	"	60	2¼	Medium	58	20	57
18 Golden Vine	" 4	111	"	45	2	Small	58		62½
19 Early Britain	" 9	116	"	65	2	"	55	40	51½
20 Large White Marrowfat	" 12	119	"	70	2½	Large	55		60½
21 Duke	" 14	121	"	75	2½	Medium	54		55
22 Wisconsin Blue	" 9	116	"	60	2½	Small	54		58½
23 King	" 14	121	"	60	2¼	"	54	20	62½
24 Mummy	" 9	116	"	50	2	"	50	40	61½
25 Nelson	" 9	116	"	55	3	Medium	48	40	61½
26 Kent	" 17	124	"	65	2	"	45	40	56
27 Mackay	" 17	124	"	65	2½	Large	45	40	56
28 Gregory	" 11	118	"	60	2¼	Medium	40		57
29 Prince Albert	" 10	117	"	55	2	Small	37	40	53½
30 Victoria	" 14	121	"	65	2	Medium	35	20	55
31 Macoun	" 17	124	"	60	2½	"	31	40	66½

EXPERIMENTS WITH INDIAN CORN.

Twenty varieties of corn were tested in hills and in rows. Both hills and rows were 35 inches apart. The corn was sown on clay loam on May 21, but in nearly all varieties one-third to one-half of the seed did not germinate, causing re-seeding during the first week in June.

Three varieties were also sown in rows at different distances apart. The yield per acre of all the varieties was computed from the weight of two rows, each 66 feet long.

In addition, six acres were sown with corn for ensilage. On account of poor germination, although re-sown, the crop was poor and unsatisfactory.

The corn land had been fallowed the previous year, and was in good condition.

The corn was cut on September 13, cut up and put in the silo.

INDIAN CORN—TEST OF VARIETIES.

Name of Variety.	Character of Growth.	Height.	Condition when Cut.	Weight per Acre Grown in rows		Weight per Acre Grown in hills.	
		Inches		Tons.	Lbs.	Tons.	Lbs.
1 Angel of Midnight	Strong	70	Tasselled	22	770	14	710
2 King Philip	"	93	"	19	500	20	1,800
3 Salzer's All Gold	"	85	"	18	1,400	23	1,630
4 North Dakota White	"	78	In silk	18	300	22	880
5 Compton's Early	"	85	Tasselled	18	300	22	220
6 Champion White Pearl	"	90	"	15	1,130	16	1,000
7 White Cap Yellow Dent	"	83	"	15	800	19	830
8 Pride of the North	"	88	Not tasselled	14	1,700	14	1,920
9 Eureka	"	100	Tasselled	13	1,500	22	
10 Red Cob Ensilage	"	90	Not tasselled	13	1,500	21	680
11 Giant Prolific Ensilage	"	80	Tasselled	13	1,280	24	180
12 Longfellow	"	80	In silk	12	1,410	18	1,400
13 Thoro'bred White Flint	"	90	Not tasselled	11	1,650	22	1,540
14 Superior Fodder	"	85	"	11	1,320	18	1,400
15 Early Butler	"	95	"	11	880	18	80
16 Evergreen Sugar	Medium	64	Tasselled	10	350	15	580
17 Mammoth Cuban	Strong	92	"	10	20	15	1,680
18 Cloud's Early Yellow	"	80	"	9	700	16	780
19 Early Mastodon	"	96	"	9	700	13	290
20 Selected Leaming	Medium	80	Not tasselled	3	600	7	630

INDIAN CORN—TEST OF SEEDING AT DIFFERENT DISTANCES.

Name of Variety.	Distance Between Rows	Character of Growth.	Height.	Weight per Acre grown in Rows	
	Inches.		Inches.	Tons.	Lbs.
Longfellow	21	Strong	80	16	1,948
"	28	"	75	10	1,255
"	35	"	82	13	1,168
"	42	"	78	9	1,803
Champion White Pearl	21	"	70	9	860
" "	28	"	75	9	704
" "	35	"	72	7	829
" "	42	"	70	6	259
Selected Leaming	21	Weak	72	5	1,882
" "	28	"	72	5	1,336
" "	35	"	65	4	1,848
" "	42	"	73	3	601

Sown in rows by grain drill, May 21; cut September 13. Land fallowed previous year. Soil, clay loam.

EXPERIMENTS WITH FLAX.

Five varieties were tested on 1-20 acre plots of fallowed land, sown May 23, by grain drill, at the rate of 40 lbs. seed per acre.

Common flax was sown on 1-20 acre plots, at the rate of 20, 30, 40 and 50 lbs. of seed per acre.

Common flax was sown on ¾ acre that had grown flax the previous year, the land being ploughed in the fall, and cultivated just before seeding.

In addition, one acre of flax was sown on fallowed land, and two plots of nearly an acre each on low spots of land that came in too late for a grain crop.

The results of all tests were as follows:—

FLAX—TEST OF VARIETIES

Name of Variety.	Character of Soil.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Weight of Straw.	Yield per Acre.
		Ac.				In.		Lbs.	Bush. Lbs.
White Flowering....	Clay loam ..	1/20	May 23..	Sept. 1..	101	22	Strong .	2,960	19 36
Yellow Seeded....	" ..	1/20	" 23..	" 1..	101	28	" ..	3,440	18 32
Improved Russian...	" ..	1/20	" 23..	Aug. 26..	95	32	" ..	3,180	18 12
Riga	" ..	1/20	" 23..	Sept. 1..	101	34	" ..	3,060	17 48
Common.....	" ..	1/20	" 23..	" 1..	101	33	" ..	3,200	12 28

FLAX—TEST OF SOWING DIFFERENT QUANTITIES OF SEED PER ACRE.

Seed per Acre.									
20 lbs	.....	1/20	May 23..	Aug. 31..	100	25	Strong .	1,640	16 24
30 "	.....	1/20	" 23..	" 31..	100	25	" ..	2,700	16 44
40 "	.....	1/20	" 23..	" 31..	100	26	" ..	1,680	18 24
50 "	.....	1/20	" 23..	" 31..	100	26	" ..	1,500	16 44

Name of Variety.	Cultivation.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Yield per Acre.
		Ac.				In.		Bush. Lbs.
Flax...	Flax stubble, ploughed..	¾	May 23..	Aug. 22..	91	30	Strong .	9 33
"	Fallow..... .	1	" 23..	" 30..	99	26	" ..	19 18
"	"	¾	" 27..	" 29 .	94	24	" ..	13 ..
"	"	¾	" 27..	" 29..	94	25	" ..	12 24

EXPERIMENT WITH SPRING RYE.

Sown May 16, on 1-20 acre plot of fallowed land. Ripe August 15; time to mature, 91 days. Straw strong; 42 inches long; weight of straw per acre, 1,880 lbs. Length of head, 3 inches. Yield per acre, 18 bushels.

EXPERIMENT WITH TARES.

Sown on 1-20 acre plot of fallowed land, May 18. Ripe September 9; time to mature, 114 days. Length of straw, 28 inches; pod, 2½ inches. Yield per acre, 26½ bushels, weighing 54 lbs. per bushel.

EXPERIMENT WITH CANARY GRASS.

(Phalaris canariensis.)

Sown May 16, on 1-20 acre plot of fallowed land. Ripe August 18; time to mature, 94 days. Straw strong, 32 inches long; weight of straw per acre, 2,200 lbs. Length of head, 1¼ inches. Yield per acre, 15 bushels 20 lbs., weighing 49 lbs. per bushel.

EXPERIMENT WITH SOJA BEANS.

Sown May 17, in rows 21, 28 and 35 inches apart. These were killed by frost, and did not mature or even form pods.

EXPERIMENT WITH HORSE BEANS.

Sown May 17, in rows 21, 28 and 35 inches apart. Cut Sept. 10.

Variety.	Rows, Distance Apart.	Height.	Yield per Acre. Dry Fodder.	
	Inches.	Inches.	Tons.	Lbs.
Horse beans	21	38	3	880
"	28	34	3	896
"	35	35	2	946

EXPERIMENTS WITH MILLETS.

Six varieties were sown May 23, on 1-40th acre plots of fallowed land. All were very poor and did not mature. Cut for feed September 10.

Variety.	Height.	Yield per acre; Dry fodder.	
	Ins.	Tons.	Pounds.
Moha Hungarian	37	3	..
White Round French	36	2	800
Italian	39	3	400
Cat Tail	31	Very little germinated.	
Early Pearl	35	"	"
Moha Green Californian	39	3	800

HAY CROP.

The hay crop the past season was light. Brome averaged about 1¼ tons per acre, and Western Rye Grass 1½ tons per acre.

One-half acre of Brome, ploughed 2 inches deep in May, 1903, disced and rolled flat, gave this year one ton of hay without re-seeding.

All the Brome and Rye Grass fields have been cut for hay from 3 to 6 years.

Timothy gave 850 lbs. on a ½ acre plot.

The ½ acre of Alfalfa sown in 1902 was almost entirely killed by the spring frosts.

TEST OF GRASSES.

In May the following clovers and grasses were sown in plots of ¼ to ½ acre each:—

Western Red Clover, Lucern, Alsike, Turkestan Alfalfa, Utah Alfalfa, Mixture of Red Clover, Alsike, Orchard and Blue Grass, Mixture of Orchard, Blue Grass and Common Alfalfa, Meadow Fescue, Red Top, Kentucky Blue Grass, English Blue Grass, Western Rye Grass.

Three varieties of Alfalfa, Common, Utah and Turkestan, were tested for the Department of Agriculture, Regina.

With the exception of Red Top, which failed to germinate, all the varieties did well. The three kinds of Alfalfa and the Red Clover did extra well.

Common Alfalfa attained a height of 20 inches, Turkestan 18 inches, and Utah Alfalfa 17 inches. All the clovers were quite well headed out before the growing season was over.

Cattle were pastured on the grasses to a small extent after the growing season, for fear of smothering out the plants from too rank a growth.

EXPERIMENTS WITH FIELD ROOTS.

With the exception of carrots, the root crop was very satisfactory. After the carrots were in full leaf, they were eaten close to the ground by the larvæ of a small moth or butterfly, and never recovered from the injury.

Turnips and mangels were good, with the second seeding rather the better.

The land for all the roots had been fallowed the previous year, with two deep ploughings and surface cultivation, and when frost came in the fall, 10 loads of manure per acre were spread on the surface, and cultivated in, shallow, just before sowing the seed in the spring.

The rows were made by grain drill, on the flat, and the seed sown by a Planet Junior turnip drill. All the rows were 28 inches apart.

Soil, clay loam. The yields per acre were obtained by weighing the roots from two rows, each 66 feet long.

TURNIPS—TEST OF VARIETIES.

Twenty varieties were sown on May 19, and again on May 27. The roots from both seedings were taken up on October 18.

Number.	Name of Variety.	Character of Soil.	Yield per Acre.							
			1st Plot.				2nd Plot.			
			Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Drummond Purple-top	Clay loam	29	268	971	8	29	1,541	992	21
2	Skirving's	"	28	854	947	34	30	814	1,013	34
3	New Century	"	26	1,318	888	38	30	248	1,004	8
4	Imperial Swede	"	26	1,036	883	56	29	834	980	34
5	Emperor	"	26	1,036	883	56	28	430	940	30
6	Jumbo	"	26	611	876	51	24	227	803	47
7	Magnum Bonum	"	26	187	869	47	30	1,946	1,032	26
8	Good Luck	"	26	46	867	26	30	1,521	1,025	21
9	Hall's Westbury	"	25	1,904	865	4	25	1,621	860	21
10	Halewood's Bronze-top	"	25	1,480	858	..	20	448	674	8
11	Perfection Swede	"	25	1,338	855	38	31	228	1,037	8
12	Elephants Master	"	24	1,641	827	21	23	247	770	47
13	Mammoth Clyde	"	23	1,944	799	4	25	1,763	862	43
14	Bangholm Selected	"	23	813	780	13	26	753	879	13
15	Kangaroo	"	22	1,964	766	4	26	1,177	919	37
16	Sutton's Champion	"	22	1,974	766	4	26	1,743	895	43
17	Hartley's Bronze	"	22	974	749	34	26	1,036	883	56
18	East Lothian	"	21	570	709	30	22	1,540	759	..
19	Selected Purple Top	"	21	287	704	47	28	6	933	26
20	Carter's Elephant	"	20	1,438	690	38	26	1,884	898	4

MANGELS—TEST OF VARIETIES.

Sixteen varieties were sown on May 19 and 27. All were taken up October 3.

Number.	Name of Variety.	Character of Soil.	Yield per Acre.							
			1st Plot.				2nd Plot.			
			Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Prizewinner Yellow Globe	Clay loam	23	1,237	787	17	27	1,581	926	21
2	Triumph Yellow Globe	"	23	388	773	8	27	1,581	926	21
3	Half-long Sugar White	"	21	..	700	..	26	1,743	895	43
4	Giant Yellow Intermediate	"	19	1,176	652	56	18	347	605	47
5	Selected Mammoth Long Red	"	19	327	638	47	16	953	549	13
6	Yellow Intermediate	"	19	186	636	26	16	1,094	551	34
7	Giant Yellow Globe	"	18	1,903	631	43	26	1,743	895	43
8	Leviathan Long Red	"	18	1,478	624	38	23	1,944	799	4
9	Half-long Sugar Rosy	"	18	1,054	617	34	14	1,134	485	34
10	Prize Mammoth Long Red	"	18	206	603	26	17	1,498	591	38
11	Mammoth Yellow Intermediate	"	17	650	577	30	23	1,237	787	17
12	Mammoth Long Red	"	16	1,094	551	34	17	1,781	596	21
13	Gate Post	"	16	528	542	8	23	247	770	47
14	Lion Yellow Intermediate	"		*		*	25	914	848	34
15	Selected Yellow Globe	"		*		*	23	621	777	51
16	Giant Sugar	"		*		*	22	1,823	763	43

* These varieties were not sown at first seeding.

CARROTS—TEST OF VARIETIES.

Ten varieties were sown May 19 and were pulled October 20. The second plots were not sown.

Number.	Name of Variety.	Character of Soil.	Yield per Acre. 1st Plot.			
			Tons.	Lbs.	Bush.	Lbs.
1	Improved Short White	Clay loam	7	284	238	4
2	White Belgian	"	6	1,294	221	34
3	Half-long Chantenay	"	5	1,314	188	34
4	Giant White Vosges	"	4	1,051	150	51
5	New White Intermediate	"	4	768	146	8
6	Long Yellow Stump-rooted	"	2	1,657	94	17
7	Carter's Orange Giant	"	2	1,091	84	51
8	Early Gem	"	2	1,091	84	51
9	Mammoth White Intermediate	"	1	1,536	58	56
10	Ontario Champion	"	1	1,536	58	56

SUGAR BEETS—TEST OF VARIETIES.

First plots sown May 19 and second plots May 27. Both were pulled October 6.

Number.	Name of Variety.	Character of Soil.	Yield per Acre. 1st Plot.			2nd Plot.			
			Tons.	Lbs.	Bush. Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Royal Giant	Clay loam	17	367	572 47	23	388	773	8
2	Danish Red Top	"	14	1,134	485 34	18	1,054	617	34
3	Improved Imperial	"	14	286	471 26	16	1,094	551	34
4	Red Top Sugar	"	14	286	471 26	18	1,196	619	56
5	Danish Improved	"	12	1,598	426 38	18	1,478	624	38
6	French Very Rich	"	11	1,194	386 34	12	43	400	43
7	Vilmorin's Improved	"	10	1,921	365 21	9	1,806	330	..
8	Wanzleben	"	9	810	313 30	9	1,658	327	38

EXPERIMENTS WITH POTATOES.

Forty-one varieties of potatoes were planted on May 20. The land was fallowed the same as for roots, and ten loads of manure applied per acre.

While the potatoes were all of a fair size, sound, and of splendid quality, the yield in no case was equal to that of 1903.

The sets were dropped in drills 30 inches apart, and the potatoes were dug on September 29. The yield per acre was obtained by weighing the potatoes from one row 132 feet long. Soil, clay loam. There was no rot in any of the varieties.

POTATOES—TEST OF VARIETIES.

Number.	Name of Variety.	Character of Soil.	Planted.	Dug.	Character of Growth.	Average Size.	Total Yield per Acre. Bush.	Lbs.	Form and Colour.
1	Penn Manor	Clay loam.	May 20..	Sept. 29..	Medium ..	Large	435	36	Long, red.
2	Uncle Sam	"	" 20..	" 29..	Strong ...	"	420	12	Oval, white.
3	Sabean's Elephant	"	" 20..	" 29..	"	"	409	12	Long "
4	Late Puritan	"	" 20..	" 29..	"	"	404	48	Oval "
5	General Gordon	"	" 20..	" 29..	"	"	393	48	" pink.
6	American Giant	"	" 20..	" 29..	"	"	391	36	Long, white.
7	Prolific Rose	"	" 20..	" 29..	" ..	Medium..	374	..	" red.
8	Early Envoy	"	" 20..	" 29..	Medium..	Large	374	..	Oval, pink.
9	Reeve's Rose	"	" 20..	" 29..	Strong ...	Medium..	374	..	" red.
10	Country Gentleman	"	" 20..	" 29..	"	" ..	371	48	Long, pink.
11	Money Maker	"	" 20..	" 29..	" ...	Large	371	48	Oval, white.
12	State of Maine	"	" 20..	" 29..	"	"	369	36	"
13	Early St. George	"	" 20..	" 29..	"	Medium..	365	12	Long, red.
14	Pingree	"	" 20..	" 29..	Medium..	" ..	360	48	" white.
15	Dreer's Standard	"	" 20..	" 29..	" .	" ..	352	..	Oval "
16	American Wonder	"	" 20..	" 29..	Strong ...	Large	345	24	Long "
17	Burnaby Mammoth	"	" 20..	" 29..	"	Medium..	345	24	" pink.
18	Carman No. 3	"	" 20..	" 29..	"	Large	343	12	Oval, white.
19	Seedling No. 7.	"	" 20..	" 29..	"	" ...	330	..	" red.
20	Holborn Abundance	"	" 20..	" 29..	"	"	327	48	" white.
21	Pearce	"	" 20..	" 29..	"	"	323	24	Long, pink.
22	Delaware	"	" 20..	" 29..	"	" ..	323	24	Oval, white.
23	Vick's Extra Early	"	" 20..	" 29..	"	"	321	12	" pink.
24	Carman No. 1	"	" 20..	" 29..	"	"	314	36	" white
25	Enormous	"	" 20..	" 29..	"	"	314	36	Long "
26	Rose No. 9	"	" 20..	" 29..	Medium..	" ...	314	36	" red.
27	Everett	"	" 20..	" 29..	" ..	"	312	24	" pink.
28	Irish Cobbler	"	" 20..	" 29..	" ..	"	305	48	Oval, white.
29	Rochester Rose	"	" 20..	" 29..	Strong ...	" ..	305	48	Long, red.
30	Early Rose	"	" 20..	" 29..	Medium..	"	288	12	Oval "
31	Maule's Thoroughbred	"	" 20..	" 29..	Strong ...	Medium..	281	36	" pink.
32	Early White Prize	"	" 20..	" 29..	Medium..	Small....	279	24	" white.
33	Empire State	"	" 20..	" 29..	Strong ...	Large ...	275	..	" "
34	Swiss Snowflake	"	" 20..	" 29..	Medium..	Medium..	259	36	Long, red.
35	Canadian Beauty	"	" 20..	" 29..	Strong ...	Large	257	24	Oval, pink.
36	Bovee	"	" 20..	" 29..	Light	"	244	24	"
37	I. X. L	"	" 20..	" 29..	Strong ...	Medium..	239	48	Long, pink.
38	Clay Rose	"	" 20..	" 29..	"	Large ...	237	36	Oval "
39	Early Andes	"	" 20..	" 29..	Medium..	Medium..	228	48	" "
40	Rawdon Rose	"	" 20..	" 29..	" ..	Large ...	226	36	" "
41	Cambridge Russet	"	" 20..	" 29..	Strong ..	Medium..	226	36	Long, russet.

SUMMARY OF CROPS, 1904.

	Bushels.
Wheat :	
8 varieties, 44 acres	1,733
8 half acres, rotation test	135
36 uniform test plots	92
	1,960
Oats :	
9 varieties, 60 acres	4,589
4 half acres, rotation test	125
42 uniform test plots	157
	4,871

	Bushels.	
Barley :		
9 varieties, 34 acres	1,512	
1 half acre, rotation test	18	
39 uniform test plots	90	
	1,620	
Pease :		
2 varieties, 4 acres	170	
31 uniform test plots	85	
	255	
Flax	52	
Rye	1	
	Tons.	Lbs.
Emmer and Spelt	....	2,254
Corn, ensilage	45	
Hay:		
Brome grass	35	
Rye grass	25	
Timothy	....	850
	60	850
	Bushels	
Roots	3,000	
Potatoes	100	
	3,100	

VEGETABLE GARDEN.

The experiments with vegetables were fairly successful this year. A few varieties of beans did not mature. Cucumbers, citrons and melons were poor. The balance of the vegetables were satisfactory.

ASPARAGUS.

Old beds of Barr's Mammoth, Barr's Elmira and Conover's Colossal were in use from May 21 to July 14, producing a good crop.

Asparagus seed was sown on May 18.

BEANS.—Sown May 21.

Imported Seed.	In Use, Green.	Ripe.	Remarks.
Dwarf Extra Early	July 26	Sept. 14	Green; very good crop.
" Emperor of Russia	Aug. 1	Did not mature	" good crop.
" Fame of Vitry	" 5	"	" "
" Black Speckled	" 3	"	" "
" Golden Skinless	" 2	"	Wax; "
" Matchless	" 1	"	Green; fair crop.
Experimental Farm Seed.			
Currie's Rust-proof	July 30	Sept. 14	Wax; very good crop.
Challenge Black Wax	" 28	" 14	" "
Early Six Weeks	" 30	" 14	Green; "
Dwarf Kidney	" 28	" 14	Wax; fair crop.
Detroit Wax	" 30	Did not mature	" "

BEETS.

Sown May 9, in use July 25; pulled October 5.
Nutting's Dwarf Improved, 347 bushels per acre; large, smooth.
Early Blood Red Turnip, 435 bushels per acre; medium size, good quality.
Flat Egyptian, 1,060 bushels per acre; large, good.
Long Smooth Blood, 411 bushels per acre; small, good.
Superb Northern Red, 686 bushels per acre; medium long.
Reselected Perfection, 686 bushels per acre; medium size.

BROCOLI.

Sown in hot-house April 1 and 20; set out May 30 and June 7; in use, August 6.
Extra Early White.

BRUSSELS SPROUTS.

Sown in hot-house April 1 and 20; set out May 30 and June 7.
Dwarf Improved, in use August 5; fair crop.
Northern Prize, in use August 5; fair crop.

CARROTS.

Sown May 9, in use July 26; pulled October 5.
Long Blood, 609 bushels per acre; large and smooth, good.
French Horn, 602 bushels per acre; medium size.
Half-long Chantenay, 484 bushels per acre; large and smooth, good.
Half-long Luc, 226 bushels per acre; medium size, good quality.

CELERY.

Large Red Ribbed, Paris Golden Yellow, Rose Ribbed Paris, Giant Pascal and White Plume were sown in hot-house, April 1; transplanted, May 2; set out, June 17; in use, September 1.

The crop was of fairly good quality.

CABBAGE.

Sown in hot-house, April 1; set out, May 30; second seeding, April 20; set out, June 7.

Name of Variety.	1st Seeding.		2nd Seeding.		Remarks.
	In Use.	Average Weight.	In Use.	Average Weight.	
		Lbs.		Lbs.	
Winningstadt Early	Sept. 10	9	Sept. 15	8	Good.
Early Jersey Wakefield	" 5	9	" 10	11	"
Extra Early Express	" 1	8	" 6	9	"
Paris Market	" 1	10	" 6	9	"
Midsummer Savoy	" 1	11	" 6	10	"
Green Globe Savoy	" 6	8	" 12	8	"
Fottler's Drumhead	" —	5	" —	5	Poor.
Large Red Drumhead	" 10	12	" —	11	Good.
Early Enfield Market	July 30	8	Aug. 4	7	"

KALE.

Drumhead Kale was sown in hot-house April 1; set out May 30, but was a failure.

CAULIFLOWER.

Sown in hot-house April 1; set out May 30. Second seeding April 20; set out June 7.

Name of Variety.	1st Seeding.		2nd Seeding.		Remarks.
	In Use.	Average Weight.	In Use.	Average Weight.	
		Lbs.		Lbs.	
Half Early Paris	July 21	6	July 30	6	Good quality, except that a few heads grew too loosely.
Earliest Dwarf Erfurt	" 21	6	" 30	6	
Early Snowball	" 21	6	" 30	6	

GARDEN CORN.

Name of Variety.	In Use, Green.	Ripe.	Remarks.
Red Squaw, sown May 20	Aug. 23	Sept. 13	Good crop.
White Squaw, "	" 23	" 13	"
Peep o' Day, "	" 13		Did not mature.
New Premo, "	" 13		"
Golden Bantum, "			"

CUCUMBERS.

Early White Spine and Cumberland were sown May 2 in hot-house; set out May 29; in flower July 10; ripe September 15. A fair crop.

CITRONS.

Preserving.—Sown in hot-house, May 2; set out, May 27 ; in flower, July 10; ripe, September 16. Medium size.

LETTUCE.

1st sowing, May 9; in use, June 16. 2nd sowing, June 4; in use, July 16. All varieties were of good quality.

The following sorts were sown:—Cabbage—Neapolitan, Tom Thumb, Blond Stonehead, All the Year Round, Red Edged Victoria and Trocadero Red Edged. Cos—Green Paris and Early Trianon.

MELONS.

The following varieties were sown in hot-house, May 2; set out, May 27. Did not mature.

Musk melon—Extra Early Green and Hamilton Market.

Water melon—Cole's Early and Phinney's Early.

The same varieties were sown in the open May 27, but did not come up.

ONIONS.

Sown in hot-house, April 1; set out, May 30; lifted, September 29.

Variety.	Yield per Acre.		Size and Quality.
	Bush.	Lbs.	
Large Red Wethersfield	217	48	Large, good.
Danver's Yellow Globe	205	42	"
Market Favorite	145	12	Medium, good.
Trebon's Large Yellow	108	54	Small, good.
Giant Prizetaker	72	36	Medium, good.
Spanish King	60	30	Small, good.

Sown in open, May 9; lifted, September 30.

Giant Prizetaker	181	30	Large, good.
Trebon's Large Yellow	145	12	Medium, fair.
Spanish King	133	6	Poor and thick-necked.
Danver's Yellow Globe	121	..	Medium, fair.
Market Favorite	121	..	Small, fair.
Paris Silverskin	121	..	"
Large Red Wethersfield	96	48	"

PUMPKINS.

Sown in hot-house, May 2; set out, May 27.
Large Yellow Field. Weight of pumpkin, 61 pounds.
New Japanese Pie. Did not fruit.

PEPPERS.

Ruby King, sown in hot-house, April 7; set out, June 10. Did not mature.

SQUASH.

Long White Bush Marrow, sown in hot-house May 2; set out, June 9; ripe, September 13. Average weight, 14 lbs. Fruit good quality, but a poor crop.
This was also sown in open, May 27, but did not come up.

KOHL RABI.

Early Purple Vienna, sown in hot-house, April 1; set out, May 30; in use, July 28; average weight, 9 pounds.

TURNIPS.

Sown, May 20; in use, August 1; pulled, October 7. Good quality.

	Yield per acre. Bushels.
Early White Strap-leaved	940
Extra Early White Milan	825
Early Stone	716
Robertson's Golden Ball	614

TOMATOES.

Sown in hot-house, April 1; set out, May 30; in flower, June 23.

In use, Green.

Earliana, September 16; some ripened; large and smooth.
Sparks' Earliana, September 10; a little rough when ripe.
Up-to-date, September 10; some ripened; light crop.
Earliest of All, September 10; some ripened; good crop and quality.

PARSNIPS.

Sown, May 9; in use, September 13; lifted, October 6.
Hollow Crown, yield per acre, 355 bushels; fair quality.
The Student, yield per acre, 508 bushels; large and good quality.

GARDEN PEASE.

Variety.	Sown May 14 and 26.				Remarks.
	1st Seeding.		2nd Seeding.		
	In use, green.	Ripe.	In use, green.	Ripe.	
Admiral	July 28..	Sept. 14..	Aug. 1..	Sept. 14..	Fair crop.
American Wonder	Aug. 1..	" 14..	" 10..	" 14..	"
Anticipation	" 1..	" 28..	" 10..	" 28..	Good.
Alaska	" 1 .	" 28..	.....	" 28 .	"
Burpee's Profusion	July 28..	" 17..	.....	" 25..	"
Extra Early	" 16..	" 6..	July 23.	" 23 .	"
Everbearing	Aug. 1..	" 24..	Aug. 12..	" 24..	"
First of All	July 14..	" 30.	July 23..	" 14..	Fair.
First and Best	" 14..	" 6..	" 23..	" 16..	"
Surprise	" 14..	" 6..	" 23..	" 16..	"
Stratagem	" 30..	" 25..	Aug. 12..	" 25..	Good.
Shropshire Hero	Aug. 6..	" 24..	" 6..	" 24..	"
Laxton's Charmer	July 28..	" 24..	" 10..	" 24..	"
Champion of England	Aug. 1...	" 25..	" 12..	" 25..	"
Horsford's Market Garden	July 28..	" 25..	" 10..	" 25..	"
Wm. Hurst	" 14..	" 6..	July 23..	" 16..	"
Rural New Yorker	" 14..	" 6..	" 23..	" 14..	Fair.
Premium Gem	" 14..	" 6..	" 24..	" 10..	"
Nott's Excelsior	" 15..	Aug. 30..	" 24..	Aug. 30..	"
Harrison's Glory	.....	.....	.....	.....	No crop.
Yorkshire Hero	Aug. 1..	Sept. 24..	Aug. 10..	Sept. 24..	Fair.

RADISH.

Sown May 9 and June 4.	1st Seeding. — In use.	2nd Seeding. — In use.	Remarks.
Early Deep Scarlet	June 9	June 30	Came up slow and were stringy.
Scarlet Forcing	" 21	" 30	" "
Early Scarlet White-tipped	" 18	" 30	" "
Early Scarlet Turnip	" 18	" 30	" "
French Breakfast	" 21	" 30	" "
Olive-shaped Scarlet	" 18	" 30	" "

Winter Radish, sown May 9; pulled, October 22.
Black Spanish, large and smooth.
Scarlet China, medium smooth.

PARSLEY.

Champion Moss-curled, sown May 9; in use, July 15; good crop.

SUMMER SAVORY.

Sown, May 9; in use, July 16; good crop.

SAGE.

Sown, May 9; in use, July 16; did well.

SPINACH.

Victoria, sown May 14; very good crop.
Flat Seeded, sown May 14; very good crop.

RHUBARB.

Sown, May 14; transplanted, June 25.

Victoria.
Myatt's Linnæus.
Experimental Farm Seed:
Scarlet Nonpareil.
Monarch Seedling,
Salt's Perfection.
Tobolsk.
} All made good growth.

Old beds in use, May 21 to September 30; good crop.

THE FLOWER GARDEN.

The flower garden was never better than the past season. While nearly all the flowers were good, Stocks, Asters and Pansies were extra fine. In the perennials, Paeonies and Irises were very good. Tulips were fine, but bloom was cut short by dry weather.

ANNUALS—Propagated in hot-house. Sown April 2.

Variety.	Set out.	Bloom.		Remarks.
		From	To	
Asters, 10 varieties	May 31	July 20	Oct. 1	Grand show.
Antirrhinum, 5 varieties	" 31	" 20	Sept. 26	Fair show.
Abronia Umbellata	June 1	" 10	" 15	Very good.
Ageratum, Dwarf Imperial	" 1	June 23	" 10	Fine border.
Alyssum maritimum	" 1	" 23	Oct. 20	Very fine.
Adonis	" 10	July 25	Sept. 10	Small red flower.
Alonsoa	" 2	" 5	" 25	Fair show.
Anagallis	" 2	" 23		Very fine flowers.
Balsam, Camellia-flowered	" 1	June 29	Frost	Very good.
Brachycome Iberidifolia	" 1	" 25	Sept. 29	Good border.
Bartonia Aurea	" 1	" 26		Fair show.
Chrysanthemum, 3 varieties	" 1	July 18	Oct. 1	Fair blooms.
Calliopsis	" 1	" 20	" 1	Very fine.
Calendula, Royal Marigold	" 1	June 29	" 20	Good blooms.
Candytuft, Empress	" 1	" 29	" 20	"
Clarkia	" 1	" 23	" 10	Very good.
Celosia, 2 varieties	" 1			Did not bloom.
Coreopsis, 3 varieties	" 1	July 18	Sept. 10	Fair blooms.
Dianthus, 8 varieties	" 1	" 10	Oct. 20	Very fine
Gaillardia picta Lorenziana	" 1	" 18	" 1	Good show.
Godetia, 4 varieties	" 1	" 10	" 1	"
Helianthus nanus	" 2	" 15	" 20	Very fine.
Helichrysum, 2 varieties	" 1	" 15	" 15	Fair show.
Hollyhock, double	" 2	" 10	" 20	Very good.
Iberis Gibraltarica	" 2			Did not bloom.
Kaulfussia, mixed	" 2			"
Linum gr. fl. roseum	" 2	July 20	Sept. 10	Some fine blooms.
Lobelia erinus, Crystal Palace	" 1	" 10	" 15	Very fine, good border.
Lupinus, mixed	" 1	" 20	" 20	
Mignonette	" 1	" 15	Oct. 10	Very good.
Mathiola bicornis	" 4	June 28	" 1	Fair show.
Nicotiana, 7 varieties	" 1	Aug. 15	Frost	Fine blossoms.
Nemophila Maculata	" 1	July 1	Oct. 20	Good border.
Nurembergia Gracilis	" 2	Aug. 5	Sept. 25	Fair.
Poppy, 5 varieties	" 1	" 1	" 25	"
Phacelia campanularia	" 1	July 25	" 16	Very good.
" grandiflora	" 1	" 25	" 16	"
Portulaca	" 1	June 25	" 19	Fine blooms.
Phlox Drummondii, 3 varieties	" 1	" 23	Oct. 20	Grand show.
Petunia, 4 varieties	" 1	July 10	Sept. 20	Extra fine.
Pansies, 8 varieties	" 1	June 20	Nov. 10	"
Scabiosa, 3 varieties	" 1	Aug. 1	Sept. 10	Fine show.
Sweet William	" 1	Biennial	Biennial	Did not bloom.
Salpiglossis variabilis	" 1	June 10	Oct. 1	Fine blooms.
Schizanthus, 2 varieties	" 1	" 23	" 1	"
Sanvitalia procumbens	" 2	July 15	Sept. 10	Not very good.
Stocks, 10 weeks	" 1	June 28	Oct. 20	Fine large blooms.
Tropaeolum, 5 varieties	" 1	July 12	" 5	Fair show.
Tagetes, 2 varieties	May 31	June 23	" 10	Good border.
Verbena hyb. auriculæflora	" 31	July 10	" 20	Very fine show.
Whitlavia gr. fl	June 2	" 1	" 1	Bloomed well.
Wahlenbergia	" 10			Did not bloom.
Zinnia elegans, 2 varieties	" 1	July 10	Oct. 1	Fine show.

ANNUALS.—Sown in the open, May 19.

Variety,	Bloom.		Remarks.
	From	To	
Alyssum, Sweet	Aug. 1	Oct. 20	Very good.
Asters	" 23	" 10	Poor.
Antirrhinum	" 4	" 10	Good.
Ageratum		" —	Did not grow.
Calliopsis	Aug. 8	" 1	Fair show.
Candytuft	July 10	Sept. 28	Good flowers.
Calendula	" 20	Oct. 10	"
Clarkia	" 20	" 10	Good.
Chrysanthemum	" 22	Sept. 24	Very fair.
Coreopsis	Aug. 20	Oct. 1	"
Eschscholtzia, 4 varieties	July 18	Sept. 21	Bloomed very fully.
Dianthus	Aug. 8	Oct. 10	"
Godetia	" 8	" 10	Fair show.
Helichrysum			Did not grow.
Marigold	July 24	Sept. 24	Fair show.
Mignonette	" 20	Oct. 10	Very good.
Phlox Drummondii	Aug. 2	" 20	"
Poppies	July 28	Sept. 26	Good.
Salpiglossis	Aug. 8	Oct. 1	"
Scabiosa	" 10	Sept. 10	"
Tropæolum	July 19	" 20	Good show.
Whitlavia	Aug. 1	" 24	"
*Sweet Pease, 33 varieties	July 26	" 28	Good succession of bloom.

*Sown May 10.

PERENNIALS.

The old beds of perennials, most of which were planted out in 1900, made very strong growth, and presented a fine succession of bloom throughout the season.

BULBS.

Tulips.—In flower from May 15 to June 2. Very fine, but suffered from the drought, which shortened the flowering period.

Dahlias.—Set out June 2; in flower July 18 till frost. The double ones were especially fine.

Gladioli.—Set out June 10; in flower August 8. Did well.

Iris.—Beds of Iris planted in 1900 bloomed freely from June 4 to July 19.

PÆONIES.

In flower from June 10 to July 15.

Last spring a large number of Japanese Iris, and some Cannas and Dahlias were sent up from the Central Experimental Farm, Ottawa. These were planted out and made satisfactory growth. A number of the Dahlias flowered very fully till September 17. Following will be found a list of those living at the close of the season.

JAPANESE IRISES.

Hana-aoi.
Momiji-no-taki.
Kumomano-sora.
Gold Bound.
Uji-no-hotaru.
Ho-o-jo.
Sofu-no-koi.
Shi-shi-ikari.
Kumo-isho.
Shichinkwa.
Violet Cap.
Mahogany.
Neptune.
Zenobia.
Kigan-no-misao.
Kasui-no-iro.
Samidare.
Shippo.
Oscar.
Shi-shi-odori.
Tsurugi-no-mai.

CANNAS.

Austria.
Baron de Poilly.
C. Bernardin.
Gladiator.
Mdlle. Berat.
Paul Marquant.
Pennsylvania.
Queen Charlotte.

DAHLIAS.

Aurata.
Bishop of Durham.
Clifford W. Bruton.
Constance.
Empress of India.
Ernest Glasse.
Gem.
Grand Duke Alexis.
Gilt Edge.
Herbert Turner.
Iridescent.
John Sladden.
John Cowan.
Lady H. Grosvenor.
Little Morris.
Lord Hawke.
Mantas la Villa.
Mrs. Wheeler.
Mrs. Dodds.
Mrs. Beedle.
Mammoth Queen.
Matchless.
Perfect Vallon.
Paragon.
Snowclad.
Snowflake.
Wm. Agnew.
Wm. Pearce
Woman in White.

In the Annual Report for 1903 a list of perennial flowers is given, most of which were sent from the Central Experimental Farm in 1900. Nearly all of these proved hardy. Included in this list was a number of varieties of iris, paeony and many other attractive perennials. Particulars as to the species and varieties tested will be found on pages 382-4 of that report.

TREES AND SHRUBS.

All trees and shrubs made large growth during the past season. All were well out in leaf by May 24, and no set-back took place up to the time of frost in September.

So rapid has been the growth of trees about fruit, and other garden plots, the last few years, that it has been found necessary to cut out in some cases, and cut back in many, the hedges surrounding these plots. While every season these hedges have been severely trimmed, they have outgrown such work, and are becoming an injury to all produce growing at all close to them. Maple and willow hedges are giving the most trouble in this respect.

Over 100,000 maple trees, in addition to a large number of shrubs have been taken up and heeled in for next spring's distribution.

ARBORETUM.

Three specimens of Populus Augustifolia were sent up from Ottawa last spring, and some cuttings of Basket Willow, which were planted out in the Arboretum. The Poplars took root readily and made strong growth, but the Willows were very slow in making a start, and had only made a weak growth at the close of the season.

All the other varieties of trees and shrubs under observation in the Arboretum, numbering about 300, a list of which was given in my report for 1903, made a better growth than usual. Many of the tender and half-hardy species were injured to a larger extent by the severe winter than they generally are, but the effects of this were soon overcome when the spring growth started.

The following trees and shrubs have done the best on the Indian Head Farm, and can be recommended for cultivation throughout the Territories:—

Botanical Name—	*Common Name*—
Acer Negundo.	Box Elder.
Acer Tataricum Ginnala.	Ginnalian Maple.
Alnus glutinosa.	Common Alder.
Betula populifolia.	White Birch.
Caragana arborescens.	Siberian Pea Tree.
Cornus stolonifera.	Red Osier Dogwood.
Cotoneaster integerrima.	Common Cotoneaster.
Crataegus chlorosarca.	
" coccinea.	Scarlet Haw.
" Crus galli.	Cockspur Thorn.
Fraxinus americana.	White Ash.
" pennsylvanica lanceolata.	Green Ash.
Lonicera Alberti.	Albert Regel's Honeysuckle.
" tatarica.	Tartarian Honeysuckle.
Populus balsamifera.	Balsam Poplar.
" deltoidea.	Cottonwood.
Rhamnus cathartica.	Common Buckthorn.
" frangula.	Breaking Buckthorn.
Ribes aureum.	Missouri Currant.
" Sibirica.	Siberian Currant.
Salix pentandra.	Laurel-leaved Willow.
" purpurea pendula.	Pendulous Purple Willow.
" Voronesh.	Voronesh Willow.
Syringa chinensis.	Rouen Lilac.
" Josikea.	Josika's Lilac.
" vulgaris.	Common Lilac.
Ulmus americanus.	American Elm.
Viburnum opulus.	Highbush Cranberry.

ARBORETUM.

The Arboretum was very attractive during the past season, and proved of interest to visitors at all times from the early spring till late in the fall. On account of the abundant rains, everything made extra strong growth.

FRUIT TREES.

Crab apples (Pyrus Baccata), Currants Red, White and Black, Raspberries Red and Black, and Gooseberries, gave fair crops of fruit this year. Plums were a poor crop, and none of the fruit ripened before frost came. Native fruit was destroyed by spring frosts.

I am sorry to report that considerable injury was done to many of the young cross-bred apple trees by rabbits last winter. When first noticed, tar-paper was tied about each tree, which protected them till the deep snow of March, when the rabbits were able to reach the branches. In some cases the young trees were entirely girdled.

PLANTING.

Last spring the following cross-bred apples and seedlings of cross-bred apples were received from the Central Experimental Farm, Ottawa, and planted:—

CROSS-BRED APPLES.

1 Manitou.
3 Alberta.
2 Dawn.
7 Tony.
2 Aurora.
4 Northern Queen.
2 Elsa.
2 Eve.
1 Bow.

SEEDLINGS OF CROSS-BRED APPLES.

5	seedlings of	Apple from Winnipeg.	2	seedlings of	Columbia.
19	"	Aurora.	2	"	Olive.
11	"	Martha.	2	"	Charles.
19	"	Alberta.	2	"	Carrie.
17	"	Tony.	6	"	Prairie Gem.
12	"	Carleton.	10	"	Cluster.
7	"	Progress.	6	"	Derby.
2	"	Cavan.	2	"	Parker.
17	"	Pioneer.	12	"	Prince.
1	"	Ruby.	13	"	Sparta.
2	"	Eve.	3	"	Eaton.
2	"	Hunter.	4	"	Eastman.

PLUMS.

Twelve seedlings of Mankato were received and set out.

STRAWBERRIES.

Twelve roots of each of the following varieties of strawberries were sent from the Central Experimental Farm and planted. A number of the roots died, but the others made fair growth:—

Greenville.
Enhance.
Crescent.
Daisy.
Johnson's Early.
Bisel.
Daniel Boone.
Williams.
And Alpine Strawberries—
St. Antoine de Padowe.
St. Joseph.
Jean d'Arc.

FRUIT CROP.

SIBERIAN CRAB. (PYRUS BACCATA.)

The Siberian Crabs planted in 1895 again bore large crops of fruit, which was ripe before frost came hard enough to injure them.

CROSS-BRED APPLES.

A number of the cross-bred apple trees set out in 1901 blossomed, and a few bore a fair crop of fruit, which much excelled the Pyrus baccata in both size and quality.

PLUMS.

A medium crop of fruit set, but owing to the unfavourable weather in August, it was very slow in maturing, and was frozen before any of it was ripe.

SAND CHERRIES.

A few varieties of sand cherry blossomed, and some fruit set, but it was poor and of little value.

SMALL FRUITS.

CURRANTS.

Red, White and Black Currants all bore a heavy crop of fruit of excellent quality. The cross-bred varieties set out in 1902 nearly all fruited this year. Following is a list of the varieties under test :—

Black.—Pomona, Stewart, Clipper, Black Victoria, Black Naples, Native Black, Perry, Eagle, Monarch, Charmer, Beauty, Ontario, Stewart, Ethel, Sterling, Standard, Orton, Star, Madee, Climax, Kerry, Eclipse, Oxford, Winona, Lewis, Prince of Wales.

Red.—Fay's Prolific, Wilder, North Star, Raby Castle, Red Dutch, Cherry, Versaillaise, Fertile d'Angers, Prince Albert, Victoria.

White.—White Imperial, White Grape, White Dutch.

RASPBERRIES.

The first fruit that ripened was rather poor and dry, owing to the hot, dry weather, but the rains at the end of July caused the berries to fill out better, and a good crop was produced.

Marlboro, Miller, Dr. Reider, Kenyon Seedling, Caroline, Garfield, Mary, Turner, Hilborn Black and Older Black all fruited well.

GOOSEBERRIES.

Houghton and Smith's Improved produced a good crop of fruit. The young plants set out in 1902 and 1903 did not fruit.

STRAWBERRIES.

Vines all died in winter of 1902-3.

CATTLE.

The herd now consists of 48 head, 25 pure-bred Shorthorns and 23 grade animals. The bull, 'Arbor,' bred by E. Porter, Lowfield, Kirkby, Lonsdale, England, is at the head of the herd.

FEEDING TEST.

On November 7, 10 steers 1½ years old, and 8 steers 2½ years old, were purchased for feeding test. When tested for tuberculosis, two of each lot reacted. They were killed and examined, and the two young ones were found to be slightly, the two older steers seriously affected with tuberculosis.

Two steers raised on the farm were added, which brought the numbers up to 8 steers 1½ years old, and 8 steers 2½ years old.

It was desired to ascertain at which age the animals could be most economically fattened.

The test, which was for sixteen weeks, commenced on December 18, when the animals were divided into two lots, lot 1 comprising the 1½ year cattle, and lot 2 those aged 2½.

They were fed as follows:—

Lot 1. Each animal received per day:—Hay, 8 lbs.; ensilage, 15 lbs.; turnips, 10 lbs.

Meal was fed at the rate of 2 lbs. per head per day for first month, and increased 2 lbs. per head per day each month during the test.

Lot 2. Per head per day:—Hay, 12 lbs.; ensilage, 20 lbs.; turnips, 15 lbs.

Meal, 6 lbs each per day for first month, and increased by 2 lbs. each per day each month of test.

Turnips were only fed during the first half of test.

The meal used consisted of two parts barley, and one part small wheat.

Straw was also fed each lot, but account was not kept of the quantity consumed.

Before the test started the steers were fed the same ration as during the first month of test, and from end of test till sold, the same as during the last month of test.

Following will be found a statement of the monthly and total weights and gains of each lot during the test and till sold; the total amount and estimated value of the feed consumed from the time the steers were bought till they were sold; and a summary of the financial results of the transaction:—

MONTHLY and total weights and gains of each lot of steers.

Lot.	Weight at start of test.	1st 4 weeks.		2nd 4 weeks.		3rd 4 weeks.		4th 4 weeks.		Total gain during test.	Weight when sold.	Gain from end of test till sold, 11 days.	Total gain.
		Weight.	Gain.	Weight.	Gain.	Weight.	Gain.	Weight.	Gain.				
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Lot No. 1, 1½ years old...	6,900	7,100	200	7,410	310	7,690	280	8,010	320	1,110	8,120	110	1,220
Lot No. 2, 2½ years old...	9,150	9,570	420	10,060	490	10,460	400	10,940	480	1,790	11,190	250	2,040
Totals....	16,050	16,670	620	17,470	800	18,150	680	18,950	800	2,900	*19,310	360	3,260

* Sold less 5 per cent shrinkage, leaving net weight 18,345 lbs.

Total weight and estimated value of feed consumed during the whole period—November 7 to April 19:

PREPARATORY FEEDING, 41 DAYS.

Lot 1.

Hay, 2,624 lbs. at $5 per ton	$ 6 56
Ensilage, 4,920 lbs. at $2 per ton	4 92
Meal, 656 lbs. at ¾c. per lb.	4 37
Turnips, 3,280 lbs. at 5c. per bushel	2 73
	$18 58

Lot 2.

Hay, 3,936 lbs. at $5 per ton	$ 9 84
Ensilage, 6,560 lbs. at $2 per ton	6 56
Meal, 1,968 lbs. at ¾c. per lb	13 12
Turnips, 4,920 lbs. at 5c. per bushel	4 10
	$33 62

Or for both lots, $52.20.

DURING TEST, 112 DAYS.

Lot 1.

Hay, 7,168 lbs. at $5 per ton	17 92
Ensilage, 13,440 lbs. at $2 per ton	13 44
Meal, 4,480 lbs. at ¾c. per lb	29 87
Turnips, 4,480 lbs. at 5c. per bushel	3 73
	$64 96

Lot 2.

Hay, 10,752 lbs. at $5 per ton	$ 26 88
Ensilage, 17,920 lbs. at $2 per ton	17 92
Meal, 8,064 lbs. at ¾c. per lb	53 76
Turnips, 6,720 lbs. at 5c. per bushel	5 60
	$104 16

Or for both lots, $169.12.

FROM END OF TEST TILL SOLD, 11 DAYS.

Lot 1.

Hay, 704 lbs. at $5 per ton	$ 1 76
Ensilage, 1,320 lbs. at $2 per ton	1 32
Meal, 704 lbs. at ¾c. per lb	4 69
	$7 77

Lot 2.

Hay, 1,056 lbs. at $5 per ton	$ 2 64
Ensilage, 1,760 lbs. at $2 per ton	1 76
Meal, 1,056 lbs. at ¾c. per lb	7 04
	$11 44

Or for both lots, $19.21.

SUMMARY OF COST OF FEEDING.

Preparatory	$ 52 20
During test	169 12
Till sold	19 21
	$240 53

Cost of feeding Lot 1—$91.31, or $11.41 per head.
Cost of feeding Lot 2—$149.22, or $18.65 per head.

SUMMARY of Financial result of the Transaction.

Lot.	Price per head.	Amount paid.	Add cost of feed.	Total cost.	Weight sold.	At	Amount received.	Gain each lot.	Gain per head.
	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	cts.	$ cts.	$ cts.	$ cts.
No. 1	21 00	168 00	91 31	259 31	7,744	4	308 56	49 25	6 15
No. 2	29 50	236 00	149 22	385 22	10,631	4	425 24	40 02	5 00
Total		404 00	240 53	644 53	18,345	4	733 80	89 27	*

* Or an average net gain of $5.58 per head.

HORSES.

There are 13 horses, young and old, on the farm at present. Two of these are very old and of not much service, one of them having been brought up from Ontario when the farm was started in 1887.

During the summer, one of the driving horses died, and has not yet been replaced.

Last spring a fine colt was born, which keeps the number of horses the same as last year.

SWINE.

Three breeds are kept.—Berkshire, Tamworth and Yorkshire White. The two first breeds have done much the best the past season.

Since sending in my last report, 1 Berkshire boar and 1 sow, and 3 Tamworth boars and 3 sows have been sold to farmers for breeding purposes.

At the present date, November 30, there are 17 Berkshire, 19 Tamworth and 2 Yorkshire White pigs on the farm.

TEST OF PASTURING HOGS ON RAPE.

In compliance with a request of Dr. Elliott, Minister of Agriculture for the North-west Territories, a test was made during the past season of feeding some swine on rape, with the addition of a small quantity of meal.

One acre of corn land, ploughed the previous fall and harrowed, was sown with three pounds of rape seed, in drills 28 inches apart, on June 1. A good catch resulted and the rape made rapid growth. Up to July 19 the acre was scuffled twice, and all weeds in rows taken out by hoe. On July 19, a wire hog-fence was put around the lot, and a cross fence in the centre, cutting the acre in two. At this date the rape was meeting in the rows, when 10 pigs—5 Berkshire and 5 Tamworth grades were put in one of the half acres. Finding the pigs were making no impression on the rape, 7 pure bred Tamworths were added on July 23, when the test commenced.

The pigs were weighed when put in on September 23 and October 23, making a three months test. When taken from the half acre on October 23, one-third of the rape was still nearly meeting in the rows, and was afterwards eaten off by cattle.

During the first two months the swine were given 2,080 pounds of meal (oats and barley, half of each), which is equal to a little less than two pounds per head per day; in the third month they consumed 1,780 pounds, which equals three and a half pounds per head per day. Whether the rape had attained too rank a growth or not, before the pigs were put on, I cannot say, but during the entire period very little was

eaten, and for the first month no impression whatever was made on the half acre. Until the meal ration was materially increased the animals were always hungry.

I give below the weights of the pigs at the different dates, with the amount of gain made:—

	July 23. lbs.	Sept. 23. lbs.	Oct. 23. lbs.
17 pigs weighed	1,345	1,760	2,210
Gain		415	450
Average weight	79	103	130
Average gain		24½	26½

From July 23 to September 23 is 62 days, and from September 23 to October 23 is 30 days. It will be observed that after the quantity of meal was increased, the animals put on flesh more than twice as fast as before.

On the half acre on which no swine were pastured the yield of rape was 16 tons, or at the rate of 32 tons per acre. It attained a height of from two to three feet.

POULTRY.

Plymouth Rock, Light Brahma and Black Minorca fowls are kept on the farm. Eggs for setting and young fowls are sold to applicants as far as they can be supplied.

SEED GRAIN FOR DISTRIBUTION.

Early last winter two cars of 60,000 pounds each, of wheat, oats and barley were made up and shipped to Ottawa for distribution. In November this year, two more 60,000 pound cars loaded with wheat, oats, barley, pease, &c., were shipped to Ottawa.

In addition there is available for seed purposes, in excess of the requirements for the distribution from this farm a considerable quantity of grain which will be sold to settlers in lots of from two to six bushels, the large demand not permitting larger quantities to be sold to one applicant.

MEETINGS ATTENDED.

During last winter I attended, in company with Dr. Elliott, Minister of Agriculture for the Territories, Institute meetings at North Portal, Estevan, Weyburn, Yellow Grass and Milestone, on the Soo line. Other meetings had to be cancelled on account of snow storms.

In February a two-days stock-judging school was held in Indian Head, which I attended and assisted at as far as possible. Stock from the Experimental Farm was provided for the judging.

EXCURSIONS.

On June 16, the Regina fire brigade organized a large excursion from Regina and intermediate points to Indian Head, and large numbers visited the farm. Between 600 and 800 people thronged the gardens and other parts of the farm during the day.

On July 1, a very considerable number, 1,000 or more, drove or walked through the grounds from morning till late in the evening.

On July 12, the Orangemen of the surrounding districts met in Indian Head, and in great crowds inspected the farm throughout the day.

And on July 19, two large excursions, from Moosomin in the east to Moosejaw in the west, numbering over 1,500 people, and with an additional 300 or 400 from the town and district, spent the day on the farm. This excursion was under the auspices of the Department of Agriculture, Regina, and during the day, Dr. Elliott, Commissioner of Agriculture, and others, addressed the visitors. Mr. Gibson, manager of the creamery at Qu'Appelle Station, gave lessons in butter-making, and W. J. Black, B.S.A., of the *Farmer's Advocate*, gave valuable instruction in stock-judging, to a large and attentive audience. The weather was very fine, and the many visitors enjoyed the day greatly.

DISTRIBUTION OF SAMPLES.

During the months of March, April and May, the following distribution of samples of the products of the farm was made to applicants throughout the Territories of Assiniboia, Alberta and Saskatchewan.

As usual, it was only possible to supply about half the number of applicants, although the number of samples sent out was considerably larger than in previous years :—

Wheat	420 bags, 3 lbs. each.
Oats	542 "
Barley	367 "
Peas	176 "
Sundries (Flax, Rye and Spelt)	153 "
Potatoes	818 "
Tree Seeds, Maple	840 bags, ½ lb. each.
Tree Seeds, Caragana	900 packets.
Grass Seed, Brome	166 bags, 1 lb. each.
Grass Seed, Western Rye	66 "
Small Seeds	446 packages, containing 7,940 packages of shrub-seed, flower-seed, root-seed, garden-seeds and corn.
Rhubarb Roots	88 packages.
Fruit Bushes	186 "
Tree and Shrub seedlings	720 "
Express parcels containing Maple seedlings and other trees and shrubs	105 parcels.

CORRESPONDENCE.

During the twelve months ending October 31, 1904, 5,849 letters, irrespective of reports on grain and other samples, were received, and 5,871 letters, not counting circulars of instruction sent with samples, were mailed from this office.

METEOROLOGICAL.

Month.	Temperature, Maximum.		Temperature, Minimum.		Snow-fall.	Rainfall.		Hours of Bright Sunshine.
1903.	Date.	Degrees	Date.	Degrees	Inches.	No. of days.	Inches.	
November	2	73	19	—16	11			82·6
December	26	39	12	—27	14			75·8
1904.								
January	7	42	24	—47	8·5			81·4
February	29	32	10	—44	22·5			120·3
March	30	38	11	—26	33			113·3
April	28	72	7	7	3·5	3	·19	165·8
May	20	78	24	24		9	1·94	165·6
June	18	90	4	34		13	2·74	221·7
July	23	92	26	38		8	3·81	209·5
August	26	86	27	33½		11	1·17	210·8
September	7	80	19	24		10	1·79	146·6
October	30	69	25	18		3	·32	145·8
					92·5	57	11·96	1,829·2

I have the honour to be, sir,
Your obedient servant,

ANGUS MACKAY,
Superintendent.

EXPERIMENTAL FARM FOR BRITISH COLUMBIA.

REPORT OF THOMAS A. SHARPE, SUPERINTENDENT.

AGASSIZ, B.C., November 30, 1904.

To Dr. WM. SAUNDERS,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit the following report of the work done and progress made on the Experimental Farm at Agassiz during the year 1904.

The season while in some respects peculiar, has been on the whole, a favourable one.

The winter was mild, the lowest temperature recorded at this station in January, being 15, with a snowfall for the month of four inches and six and a quarter inches of rain. February, the coldest was 17 degrees of frost and nearly nine inches of rain and thirty-two inches of snow.

There was less rain and snow in March, the fall being 5¼ and 6½ inches respectively, and the coldest was 30 on two occasions, but the prevailing winds were north-west and north-east and there was very little progress in vegetation.

A temperature of 30 with a sharp frost on April 29 caught many of the fruit trees in bloom and a good deal of the bloom fell off, especially in the case of the plums.

The weather turned drier in May, the rainfall for the month being less than 2½ inches, which is much lower than usual, but the winds were cool and growth very backward.

June remained cool and although the rainfall was a little heavier than that of May, yet the grass and clover began to show need of more rain.

In July the rainfall was light and the weather became warm and growth was rapid, except in clover fields where the second crop had been cut, corn and all sorts of grain made rapid progress. The weather continued bright and warm throughout August, September and October with very light rainfall, very fine for harvest and all other farm work but almost too dry for root crops.

On the whole, the season, although rather dry during most of the summer has been very favourable for farm work, and even root crops, where the soil was kept stirred, have been satisfactory, and the weather for harvesting them exceptionally fine. Up to the present date we have not had a killing frost, roses and sweet pease being still in bloom in the open garden.

FRUIT CROP.

The continued wet weather in May and early June damaged the cherry crop and to some extent injured the strawberry crop, but with clearer, warmer weather the larger fruits had a better chance. Plums and pears were light in many orchards owing to the frost in last of April, and the cool weather in April and May, but the sample was fine and there was less rot in the plums than usual. The apples, too, were freer from skin diseases, and owing to the bright sunny autumn were better coloured and finer than usual.

HEDGES.

Many people are making inquiries as to the best hedges. In evergreens, wherever it will stand the climate the holly makes a very handsome hedge, making a close com-

pact growth and, when old enough to produce berries, the glossy green leaves and bright red berries make it a thing of beauty.

The eastern hemlock, eastern arborvitae, Norway spruce, pyramidal arborvitae, and the native cedar all make very compact handsome hedges which look well always.

For flowering hedges, the weigelias, deutzias, Japan quince or Japanese snowball all look well when in bloom.

ORNAMENTAL TREES AND SHRUBS.

There was a heavy fall of soft damp snow in February which clung to the trees and shrubs and some were crushed and injured, but none so much as to ruin them, with this exception, the growth has been very strong and many of the flowering trees and shrubs never looked better than they did this year. In flowering trees the double flowering thorns, pink, scarlet and white, the laburnum, and the flowering dogwood, pink and white, grow luxuriantly and flower profusely.

In shrubs the Japanese quince and Japanese snowball, the weigelias, spiraeas, hydrangeas, syringas, deutzias, philadephus and many others make a fine display of bloom from the last of March until June, and many of the shrubs and trees having variegated or purple foliage make a strikingly handsome appearance all summer.

The timber and nut trees in the forest belt continue to grow and thrive, and many of the trees planted on the mountain side are getting above the underbrush, and when the trees get their autumn tints are distinctly noticeable.

NUT TREES.

The English and American black walnuts each produced a few nuts, and the Japanese walnut a fine crop. The chestnuts also, many of them, had a fair crop of nuts. Many requests for nuts and tree seeds are received from farmers throughout the province, and reports coming in of the nuts distributed in former years show that there is a live interest being taken in nut tree growing, as the trees when once well established, make a rapid growth and soon become handsome shade trees as well as nut producers. The filberts of all the nut producers are unsatisfactory, the crop on all the varieties being very poor, and the bluejays begin to carry them off before they are properly filled.

DITCHING.

Considerable ditching has been done during the year, and the old ditches where open have been cleaned out, and many of the wet places along the foot of the mountains are now dry and will be cleared of brush and put under cultivation and pasture as rapidly as possible.

NEW BREAKING.

About 8 acres have been ploughed and disked, and are now being ploughed again to be in readiness for a crop next year.

LIVE STOCK.

The cattle here are all registered short-horns, and the herd consists of 9 cows,, 4 heifers, 3 bulls and 7 calves, 4 of these are bull calves, and 3 heifer calves. One short-horn cow was sold for beef, as she proved to be barren. One of the bull calves mentioned in my report last year has been sold as a breeder and the other is on hand.

SHEEP.

The flock at present consists of fifteen ewes and ewe lambs, and six rams. Three ewes were lost since my last report, one died of old age, and the other two from unknown causes, as the flock has been at all times healthy. Two barren ewes and two rams were sold to the butcher, and one ram for a breeder. The Dorset Horned sheep appear to make a satisfactory cross with the common sheep, buyers being pleased with the results, and butchers say that the grade lambs dress very well.

PIGS.

The stock now on hand consists of two Yorkshire White sows and a Yorkshire White boar, all very fine individuals, and six young pigs of this breed. A Berkshire boar, three young sows and seven pigs, all fine thrifty animals.

HORSES.

The horse stock is the same as last year, but an effort is being made to get a young heavy team, as the area under cultivation is getting greater and more team force is necessary.

Young heavy teams are very scarce, but it is hoped that before the work commences in spring a team will be got.

BEES.

Seven swarms of bees were taken into winter quarters, but three of them died before spring, and the others were much reduced in strength when spring opened. Three fine swarms have been saved this season, and there are now seven strong colonies which are well supplied with honey to carry them over the winter.

FOWLS.

There are now on the farm five breeds of fowls, Black Minoreas, Rose Comb Brown Leghorns, B. P. Rocks, Brahmas and Buff Orpingtons. As in former years, the Black Minoreas have been the best layers, and their eggs are large; the R. C. Brown Leghorns laid nearly as many eggs as the Black Minoreas, but their eggs were smaller.

Of the last three named breeds, the B. P. Rocks are the best layers.

Brahmas and Buff Orpingtons are about equal with us as layers, but the B. P. Rocks and Buff Orpingtons mature earlier than the Brahmas and all three breeds are good sitters, and good mothers, and are profitable as layers until two and a half years old, when they are apt to get too fat and lay fewer eggs.

The hens are kept in breeding pens, with yards attached, from January 1 to July 1. During the rest of the year they are allowed to run at large.

They are seldom troubled with any disease except sometimes a little rheumatism, which is caused by the wet weather; but crows, hawks and skunks carry off a good many chickens, even after they are well grown.

We have had an average of 60 per cent of chickens from eggs put into the incubator. These chickens are raised in a brooder, which is kept in a brooder-house, and have been strong and thrifty, but they have not been either stronger or healthier than chickens hatched and raised by hens, nor has the per cent of loss been greater from any cause.

The hens are fed mixed grains, ¾ wheat, ¼ oats and ¼ pease, sunflower seeds in the autumn, and during the coldest weather in winter they get once a day boiled roots and chop mixed, and a cabbage head or some vegetable always before them.

The hen-house is whitewashed several times a year. The roosts and nest boxes are movable, so as to be easily cleaned and renewed, and they are given clean chaff or straw on a swept floor once a week.

EXPERIMENTS WITH OATS.

Forty-three varieties of oats were sown on one-fortieth of an acre plots. The soil was a sandy loam, in fair condition, having been in corn the previous year and the corn had been planted on clover stubble with a luxuriant aftergrowth of clover turned under. The mountain close on the east side of the field and a fir wood on the west deprived it of the early morning and evening sunshine, and perhaps on this account aided the spread and growth of rust, which was more or less in evidence in all the varieties, and which lessened the yield to a considerable degree. All were sown April 16.

OATS— TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw	Yield per Acre.		Weight per Bushel.	Rusted
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.	
1	Golden Fleece	Aug. 8	114	44	Medium..	10	Branching..	5,520	67	2	36	Slightly.
2	White Giant	" 13	119	46	" ..	9	" ..	5,400	61	16	35½	"
3	Thousand Dollar	" 11	117	42	" ..	10	" ..	5,200	61	6	38	Consid'ably.
4	Holstein Prolific	" 8	114	40	Strong....	10	" ..	5,840	60	20	34½	"
5	Irish Victor	" 12	118	40	Medium..	10	Sided.....	5,520	60	10	36	
6	Kendal White	" 13	119	42	" ..	8	Half sided..	5,680	59	24	36	Badly.
7	Pense Black	" 12	118	46	" ..	9	Branching..	5,680	59	14	35½	"
8	Banner	" 8	114	44	" ..	10	" ..	5,800	59	4	36	Slightly.
9	Olive Black	" 12	118	44	" ..	8	Sided....	5,840	58	28	35½	"
10	Improved Ligowo	" 8	114	46	" ..	9	Branching .	5,600	58	18	36½	"
11	Buckbee's Illinois	" 12	117	44	" ..	9	" ..	5,400	58	8	35	Badly.
12	Improved American	" 13	119	46	" ..	9	" ...	5,600	57	32	34½	Slightly.
13	Lincoln	" 13	119	46	" ..	10	" ..	5,920	57	22	35½	Badly.
14	Tartar King	" 10	116	44	" ..	9	Sided.....	5,840	57	22	35½	Slightly.
15	Waverley	" 10	116	44	Stiff	10	Branching..	5,800	57	2	35	"
16	Kendal Black	" 13	119	42	Medium..	10	Sided.....	5,800	56	26	34½	Badly.
17	Abundance	" 13	119	40	" ..	9	Branching..	5,360	56	26	36	"
18	Olive White	" 12	118	46	" ..	9	Sided.....	5,680	56	16	35½	Consid'ably.
19	Pioneer	" 9	115	42	" ..	9	Branching..	5,520	56	16	35	Badly.
20	Bavarian	" 8	114	44	" ..	9	" ..	5,600	56	6	35	Slightly.
21	Siberian	" 11	117	42	" ..	10	" ..	5,600	55	30	35½	Badly.
22	American Triumph	" 8	114	42	Stiff..	9	" ..	5,520	55	20	35½	Consid'ably.
23	Pense White	" 9	115	38	Medium..	10	" ..	5,600	55	10	34	Badly.
24	Wide Awake	" 12	118	40	" ..	9	" ..	5,600	54	24	35	"
25	Twentieth Century	" 12	118	40	" ..	11	" ..	5,800	54	14	34½	Slightly.
26	Joanette	" 11	117	40	" ..	9	" ..	5,520	54	4	36	"
27	Black Beauty	" 8	114	44	" ..	10	" ..	5,600	53	28	35	Badly.
28	Milford White	" 12	118	44	" ..	9	Sided.....	5,520	53	18	35½	"
29	Storm King	" 8	114	46	" ..	11	"	5,920	52	32	36½	Consid'ably.
30	Swedish Select	" 9	115	46	" ..	9	Branching..	5,120	52	27	35	"
31	Golden Giant	" 15	121	44	" ..	9	Sided.....	5,680	52	22	34¾	Badly.
32	Golden Tartarian	" 15	121	42	Stiff.	11	"	5,840	52	12	35	Consid'ably.
33	Scotch Potato	" 13	119	40	Medium..	10	Branching..	5,840	51	26	35½	Slightly.
34	Danish Island	" 9	115	42	" ..	9	" ..	5,760	51	16	36	"
35	Swedish Probstey	" 10	116	46	" ..	9	" ..	5,920	51	6	36	Badly.
36	American Beauty	" 15	121	41	" ..	10	" ..	4,960	50	30	35	"
37	Mennonite	" 9	115	44	" ..	10	" ..	5,600	50	25	35	Slightly.
38	Early Golden Prolific	" 9	115	40	" ..	9	" ..	5,440	50	20	35	"
39	Columbus	" 12	118	41	Weak	8	" ..	5,400	50	10	36	Badly.
40	Golden Beauty	" 13	119	42	Medium..	10	" ..	5,600	50	..	34½	"
41	Milford (black)	" 8	114	38	" ..	8	" ..	5,400	49	24	35	"
42	Goldfinder	" 13	119	40	" ..	9	" ..	5,360	48	28	34½	Consid'ably.
43	Sensation	" 12	118	46	" ..	11	" ..	5,840	47	22	35	"

EXPERIMENTS WITH BARLEY.

Thirty-five varieties of barley were sown this year, twenty of which were six-rowed sorts, and fifteen two-rowed. The land for this test was a sandy loam which had been in clover and was top dressed in the spring of 1902 with about twelve tons of barn-yard manure, a heavy growth of clover was ploughed under in the fall of that year and repeatedly disked and harrowed in the spring of 1903, and a crop of potatoes grown on it, which left it in good condition for barley this season. The yields have been fairly good, and owing to bright, dry harvest weather, the sample is good. The plots were all one-fortieth of an acre and all sown April 23. There was no rust or smut on any of the varieties grown.

SIX-ROWED BARLEY—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.		Yield per Acre.		Weight per Bushel.
			In.		In.		Tons.	Lbs.	Bush.	Lbs.	Lbs.
Albert	Aug. 4	102	38	Medium	3	Six-rowed	3	1,520	63	36	48
Mensury	" 4	102	38	Strong	3	"	3	1,720	62	24	48
Claude	" 4	102	36	Medium	3	"	3	1,320	60	40	48
Oderbruch	" 2	100	42	Strong	3	"	4		58	6	48
Brome	" 6	104	39	Medium	3	"	3	1,640	57	24	49
Odessa	" 1	99	44	Strong	3	"	3	720	57	14	48
Common	" 4	102	36	Medium	3	"	3	1,200	56	12	48
Empire	" 5	103	40	Strong	3	"	3	1,600	55	20	48
Argyle	" 5	103	40	Medium	3	"	3	1,320	55		49
Baxter	" 2	100	36	"	2½	"	3	1,240	54	28	48
Stella	" 12	110	36	"	2½	"	3	520	53	26	48
Champion	" 1	99	38	"	2½	"	3	1,440	53	6	48
Garfield	" 5	103	38	"	2½	"	3	1,420	51	12	48
Trooper	" 14	112	38	Strong	3	"	3	760	50	50	48
Summit	" 10	108	39	Medium	3	"	3	1,200	50	40	48
Mansfield	" 6	104	38	"	2½	"	3	1,400	48	36	48
Yale	" 13	111	40	"	2½	"	3	1,600	48	26	48
Nugent	" 11	109	44	"	3		3	1,420	47	24	48
Royal	" 9	107	40	"	3		3	1,720	46	12	48
Rennie's Improved	" 2	100	40	"	3		3	1,520	45		48

TWO-ROWED BARLEY—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.		Yield per Acre.		Weight per Bushel.
			In.		In.		Tons.	Lbs.	Bush.	Lbs.	Lbs.
Logan	Aug. 10	109	40	Bright & stiff	3½	two-rowed	3	1,600	67	44	49
Danish Chevalier	" 12	111	40	"	3½	"	3	1,360	56	32	49
Sidney	" 13	112	43	Medium	3½	"	3	1,720	56	32	48
Canadian Thorpe	" 10	109	41	"	3½	"	3	320	56	2	49
Standwell	" 13	112	43	"	3½	"	4	400	56	12	48
Jarvis	" 11	110	46	Strong	3½	"	3	1,840	52	24	48
French Chevalier	" 12	111	47	Medium	4	"	3	1,720	52	4	49
Gordon	" 8	107	40	"	3	"	3	1,120	51	12	49
Beaver	" 10	109	44	"	3	"	3	1,400	50	20	49
Newton	" 13	112	40	Strong	3	"	3	1,280	50	10	48
Fulton	" 9	108	40	Medium	3	"	3	1,440	50		49
Dunham	" 9	108	43	"	3½	"	3	1,480	49	8	48
Harvey	" 8	107	38	"	3	"	3	1,660	48	16	48
Invincible	" 11	110	42	Strong	3	"	3	1,400	46	12	48
Clifford	" 9	108	44	"	3	"	3	1,840	45	40	48

EXPERIMENTS WITH SPRING WHEAT.

Thirty-six varieties of spring wheat were tested in plots of one-fortieth of an acre each. The land was a sandy loam, had been in grass for two years, followed by corn in 1903, and although the yields are not heavy the sample is good as it had fine dry weather for harvest. The plots were sown at the rate of one and a half bushels per acre. All the plots were sown April 25, and were free from rust or smut.

SPRING WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.	
				In.		In.		Lbs.	Bush.	Lbs.
1	White Fife	Aug. 18	115	46	Stiff	3	Beardless	5,400	33	20
2	White Russian	" 19	116	48	"	4	"	5,800	32	40
3	Wellman's Fife	" 19	116	46	Medium	3	"	5,600	32	..
4	Red Fife	" 17	114	48	Stiff	3	"	5,800	32	..
5	Stanley	" 17	114	48	"	3½	"	5,800	31	20
6	Minnesota No. 163	" 16	113	41	"	3½	"	5,700	30	10
7	Admiral	" 16	113	48	"	3½	"	5,600	30	..
8	Benton	" 18	115	44	Medium	2½	"	6,080	29	..
9	Percy	" 13	110	46	Stiff	3	"	4,520	28	40
10	Hayne's Blue Stem	" 16	113	48	"	3½	"	5,840	28	20
11	Countess	" 12	109	44	"	4	"	6,600	27	40
12	Powers' Fife	" 17	114	43	"	3	"	5,520	27	30
13	McKendry's Fife	" 16	113	42	Medium	3	"	5,400	27	20
14	Laurel	" 16	113	42	"	3	"	5,600	27	20
15	Australian No. 9	" 17	114	46	Stiff	3	"	5,800	27	10
16	Byron	" 17	114	48	"	3	Bearded	5,680	27	..
17	Clyde	" 18	115	40	"	3	Beardless	6,320	26	50
18	Preston	" 13	110	46	"	3	"	5,480	26	40
19	Weldon	" 18	115	46	Medium	3	"	5,600	26	30
20	Huron	" 15	112	44	Stiff	3½	Bearded	6,080	26	..
21	Monarch	" 18	115	45	"	3	Beardless	5,680	25	50
22	Hungarian	" 16	113	46	"	3½	Bearded	6,000	25	40
23	Chester	" 18	115	42	Medium	3	Beardless	6,200	25	20
24	Plumper	" 16	113	42	Stiff	3	Bearded	6,400	24	20
25	Australian No. 19	" 15	112	48	"	3½	Beardless	5,680	24	..
26	Rio Grande	" 17	114	44	Medium	3½	"	6,060	23	40
27	Crawford	" 13	110	46	"	3	"	5,600	23	20
28	Colorado	" 13	110	44	Stiff	3½	Bearded	6,400	23	..
29	Red Fern	" 18	115	43	Medium	3½	"	5,810	22	50
30	Pringle's Champlain	" 16	113	42	"	3	Beardless	5,560	22	40
31	Advance	" 15	112	46	Strong	3	Bearded	5,520	22	20
32	Herisson Bearded	" 18	115	40	Weak	3	"	5,480	22	..
33	Dawn	" 15	112	48	Stiff	3½	Beardless	5,000	20	40
34	Hastings	" 15	112	12	"	3½	"	5,680	18	40
35	Early Riga	" 11	108	40	Weak	2½	"	5,000	18	..
36	Fraser	" 13	110	48	Stiff	3	Bearded	5,600	17	20

MACARONI WHEAT.

Four varieties of this class of wheat were sown in plots of the same size alongside of the bread wheat plots. The yields are fairly good, but not better than in the regular classes, and as all of them are heavily bearded, they are not better than in become popular. There was no rust or smut in any of these plots.

MACALONI WHEAT—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Proportion Rusted.
			In.		In.		Lbs.	Bush.	Lbs.	
Goose	Aug. 15.	112	47	Stiff and bright..	3½	Bearded	6,400	29	20	No rust or smut.
Mahmoudi	" 20.	114	48	" ..	3½	" ..	5,600	28	..	"
Yellow Gharnovka.	" 19	116	46	" ..	3	" ..	5,440	26	40	
Roumanian	" 17.	114	48	" ..	3½	" ..	5,800	26	..	

EMMER AND SPELT.

Four plots of this class were sown alongside of the wheat plots. The yields are very fair and the straw is bright and clean, and is eaten by cattle as a change in their rations, more readily than wheat or oat straw. From reports of samples sent to the dry parts of the interior it has in each case given satisfactory yields, but the bearded sorts are disliked.

EMMER AND SPELT—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Weight of Grain as threshed.
			In.		In.		Lbs.	Lbs.
Common Emmer.	Aug. 20..	117	36	Weak	2	Bearded....	5,360	1,920
Red Emmer	" 20..	117	40	Strong	3	"	5,600	1,840
Red Spelt	" 19..	116	40	Medium..	3½	Beardless...	5,840	1,680
South Dakota No. 524	" 18..	115	38	"	2½	Bearded....	5,680	1,660
White Spelt	" 20..	117	38	"	5	Beardless...	5,240	1,590
South Dakota No. 3..	" 19 ..	116	36	Weak	2	Bearded....	5,520	1,470

PEASE.

Thirty-three varieties of field pease were tested this year. They were sown on sandy loam which had a heavy growth of clover turned under. The land was in apple orchard and although a strip of six feet on each side of the rows of apple trees was left unsown, yet the shade of the trees injured the crop and lessened the yield. The clear dry weather at harvest time allowed the crop to be harvested in good condition.

The following is a statement of the yields computed from plots of one-fortieth of an acre each.

PEASE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	Number of Days Maturing.	Character of Growth.	Length of Straw.	Weight of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.		Weight per Bushel.
					In.	Lbs.	In.		Bush.	Lbs.	Lbs.
1	Kent	Aug. 15	122	Strong	52	5,600	3	Large	40		62½
2	Macoun	" 16	123	"	51	5,400	2½	"	38	50	62
3	Canadian Beauty	" 11	118	"	56	5,200	3	"	38	40	61
4	Daniel O'Rourke	" 9	116	Medium	40	5,040	2½	Small	38	40	61½
5	German White	" 9	116	Strong	56	5,400	3	Medium	38	30	63
6	Duke	" 16	123	"	58	5,680	2½	Large	37	30	60½
7	White Marrowfat	" 15	122	"	50	5,640	3½	"	37	20	60
8	Victoria	" 16	123	Medium	48	5,360	3	Medium	36	40	61
9	Early Britain	" 9	116	"	50	5,400	3	"	35	40	62
10	English Grey	" 13	120	"	56	5,520	3	"	35	30	60
11	Prince	" 15	122	Strong	46	5,200	3	Large	35	20	60½
12	Wisconsin Blue	" 12	119	Medium	60	5,280	2½	Small	34	40	61
13	Gregory	" 13	120	Strong	58	5,200	3	Medium	34	20	60
14	Mummy	" 12	119	Medium	56	5,600	3	"	34		61½
15	Crown	" 8	115	"	54	5,440	3	Small	33	20	61½
16	Pride	" 10	117	Strong	54	5,600	3	Large	33		61
17	Mackay	" 14	121	"	56	5,600	3	Medium	32	50	60½
18	Prussian Blue	" 9	116	"	48	5,520	3	"	32	40	60
19	Paragon	" 16	123	"	58	5,200	3	"	32	30	61
20	Carleton	" 12	119	"	60	5,680	2½	"	32	20	62
21	King	" 12	119	"	54	5,440	3	Large	32	10	60½
22	Black-eyed Marrowfat	" 9	116	"	50	5,720	3	"	32		60
23	Nelson	" 12	119	"	56	4,800	3	Medium	30	40	61
24	White Wonder	" 8	115	Medium	56	5,840	2½	"	30	30	61½
25	Prince Albert	" 13	120	"	48	5,200	2½	Small	30	20	62
26	Pearl	" 16	123	Strong	68	5,320	3	Large	29	20	61
27	Arthur	" 13	120	"	50	5,690	3	"	28	40	62½
28	Canadian Beauty	" 11	118	"	56	5,200	3	Very large	28	30	61
29	Golden Vine	" 10	117	Medium	56	5,920	2½	Small	28	10	61
30	Picton	" 16	123	Strong	50	5,000	3	Medium	28		60
31	Archer	" 16	123	Medium	50	5,240	2½	"	27	20	60
32	Agnes	" 13	120	Strong	55	5,360	3	"	27	10	62
33	Chancellor	" 16	123	"	54	5,280	3	"	26	40	62

EXPERIMENTS WITH INDIAN CORN.

Nineteen varieties of corn were tested this year on soil which was quite sandy. This had been in wheat the previous year, and with the wheat about 10 lbs. of red clover seed was sown. The clover made a strong growth after the wheat was harvested, and was ploughed under early the following spring, and harrowed several times before the corn was planted. As in previous years, all the varieties were tested in drills three feet apart in the drill, and the corn thinned to about six inches apart, and in hills three feet apart each way, and about three plants in the hill. In this district where there is as a rule plenty of rain all summer, and a great deal of foliage on the stalks, we have generally found a better development of ears when grown in hills, and where there was corn on the ear it was more matured than that in the rows. Further, the hills give more room for air and sunlight, and a better chance to fight the weeds, as the horse hoe can be used both ways. This probably more than compensates for the larger crops secured from

the drills. All the plots were sown May 20, and cut October 8, 10 and 11. Four rows one hundred feet long were planted, and the weight per acre computed from the crop obtained from 66 feet of the two centre rows in each case.

INDIAN CORN—TEST OF VARIETIES.

Number.	Name of Variety.	When Tasselled.	In Silk.	Early Milk.	Condition when cut.	Weight per Acre grown in Rows.		Weight per Acre grown in Hills.	
						Tons.	Lbs.	Tons.	Lbs.
1	Compton's Early	Aug. 18	Aug. 24	Sept. 20	Roasting ear	19	1,840	15	360
2	Superior Fodder	Sept. 4	Sept. 20		Ears formed	18	88	15	800
3	Salzer's All Gold	" 10	" 28		In silk	16	1,440	15	1,240
4	Mammoth Cuban	" 12	" 30		"	16	560	10	1,240
5	Eureka	Aug. 28	" 14	Oct. 6	Early milk	14	600	15	800
6	Angel of Midnight	" 24	" 10	Sept. 30	"	14	400	11	1,800
7	Giant Prolific Ensilage	Sept. 1	" 20	Oct. 6	"	13	1,500	14	1,480
8	Red Cob Ensilage	Aug. 28	" 1	Sept. 20	Late milk	13	1,500	13	620
9	Early Butler	" 24	" 5	" 30	Early milk	13	400	11	110
10	Cloud's Early Yellow	" 18	" 7	" 24	Late milk	12	240	13	180
11	Champion White Pearl	Sept. 4	" 20	Oct. 1	Early milk	11	1,540	13	400
12	Pride of the North	" 1	" 14	" 8	"	11	1,430	12	90
13	White Cap Yellow Dent	" 1	" 15	Sept. 30	"	10	1,560	11	1,980
14	Longfellow	Aug. 18	" 3	" 20	Late milk	10	1,120	9	1,800
15	King Philip	" 16	" 14	Oct. 8	Early milk	10	20	9	700
16	Selected Leaming	" 28	" 22	" 1	"	9	1,800	10	240
17	Early Mastodon	Sept. 4	Oct. 1		In silk	9	1,690	8	1,820
18	North Dakota White	Aug. 26	Sept. 12	Oct. 8	Early milk	7	300	8	1,380
19	Evergreen Sugar	Sept. 6	" 20	" 1	"	5	670	5	10

EXPERIMENTS WITH TURNIPS.

Twenty-five varieties of turnips were tested this year. The land was a sandy loam which had given a crop of wheat in 1902, and was seeded with clover with the wheat, top dressed with about 12 tons of barnyard manure per acre in the winter of 1902 and 1903. The clover, which was a fine stand, was mown twice in 1903, and a fine aftermath turned under in November of 1903. It was disked and harrowed, and given another light dressing of stable manure in early spring. This was well worked into the soil with disk and drag, and the land was in good condition when the seed was sown. Two sowings of each sort were made, the first May 13, and the second May 27. Had the season been a normal one there would doubtless have been a heavy yield. All were sown on the flat in drills, four rows of 100 feet length, 30 inches apart, were sown in each test, and the yield per acre computed from 66 feet of the two centre rows. All were harvested October 24.

TURNIPS—TEST OF VARIETIES.

Number.	Name of Variety.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre. 1st Plot. Tons.	Yield per Acre. 1st Plot. Lbs.	Yield per Acre. 1st Plot. Bush.	Yield per Acre. 1st Plot. Lbs.	Yield per Acre. 2nd Plot Tons.	Yield per Acre. 2nd Plot Lbs.	Yield per Acre. 2nd Plot Bush.	Yield per Acre. 2nd Plot Lbs.
1	Carter's Elephant					40	685	1,344	45	31	205	1,036	45
2	Halewood's Bronze Top					39	870	1,314	30	32	1,670	1,094	30
3	Elephant's Master					38	1,550	1,292	30	34	640	1,144	..
4	Bangholm Selected					37	1,900	1,265	..	35	600	1,176	40
5	East Lothian					34	1,940	1,165	40	40	520	1,342	..
6	Prize Purple Top					34	1,305	1,155	05	29	1,940	1,166	10
7	Perfection Swede					34	1,140	1,152	20	31	1,360	1,056	..
8	Skirvings					30	390	1,006	30	38	1,220	1,287	..
9	Magnum Bonum					28	1,750	962	30	31	40	1,036	45
10	Drummond Purple Top					28	100	935	..	23	860	781	..
11	Kangaroo					26	470	874	30	25	490	841	30
12	Good Luck					25	305	871	45	24	1,605	816	45
13	Selected Purple Top	May	13	May 27	Oct. 24	Oct. 24	25	1,480	858	..	23	1,190	786	30
14	Imperial Swede					25	1,315	855	15	25	820	847	..
15	Hall's Westlary					25	820	847	..	21	900	715	..
16	Jumbo					24	1,095	816	45	20	790	679	50
17	Improved Elephant					24	510	808	30	21	960	715	..
18	Mammoth Clyde					23	1,190	786	30	22	880	748	..
19	Queen					23	260	770	..	21	1,890	731	30
20	Emperor Swede					22	1,870	764	30	31	1,535	1,058	45
21	Empress					22	1,375	756	15	24	1,170	819	30
22	Sutton's Champion					22	880	748	..	31	1,360	1,056	..
23	Hartley's Bronze					22	220	737	..	21	1,230	720	30
24	Bronze Globe					20	425	673	45	24	1,830	830	30
25	New Century					19	115	635	15	18	1,620	627	..

EXPERIMENTS WITH CARROTS.

Ten varieties of carrots were included in the test this year. As in the other root tests, two separate sowings were made of each variety. The first sowing was made April 25, and the second two weeks later, on May 9. As in previous years, the intermediate or Vosges sorts yield better than the long sorts, and are much easier and consequently cheaper to harvest, and less liable to be broken in handling. Four rows of each sort, each 100 feet long, were sown, and the yield per acre computed from the yield of 66 feet of the two centre rows. These test plots were alongside of the mangels and the soil conditions were the same. The drills were 30 inches apart. All were harvested October 24.

CARROTS—TEST OF VARIETIES

Number.	Name of Variety.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre. 1st Plot. Tons.	Yield per Acre. 1st Plot. Lbs.	Yield per Acre. 1st Plot. Bush.	Yield per Acre. 1st Plot. Lbs.	Yield per Acre. 2nd Plot. Tons.	Yield per Acre. 2nd Plot. Lbs.	Yield per Acre. 2nd Plot Bush.	Yield per Acre. 2nd Plot Lbs.
1	Giant White Vosges	April 25	May 9	Oct. 24	Oct. 24	21	1,232	720	32	19	610	643	30
2	Carter's Orange Giant	" 25	" 9	" 24	" 24	17	650	577	30	9	975	316	15
3	Mammoth White Intermediate	" 25	" 9	" 24	" 24	13	520	442	..	13	100	440	
4	Ontario Champion	" 25	" 9	" 24	" 24	13	355	439	15	11	1,760	396	..
5	Early Gem	" 25	" 9	" 24	" 24	13	460	440	..	12	585	409	45
6	Long Yellow Stump Rooted	" 25	" 9	" 24	" 24	12	1,080	418	..	11	440	374	..
7	White Belgian	" 25	" 9	" 24	" 24	11	1,760	396	..	10	1,780	363	..
8	New White Intermediate	" 25	" 9	" 24	" 24	11	770	379	30	10	955	349	15
9	Improved Short White	" 25	" 9	" 24	" 24	9	1,460	324	20	11	605	376	45
10	Half Long Chantenay	" 25	" 9	" 24	" 24	8	1,820	297	..	8	5	266	45

EXPERIMENTS WITH MANGELS.

Eighteen varieties of mangels were tested this season. Two sowings of each sort were made, the first sown April 25, and the second May 9. Four rows of 100 feet long, 30 inches apart were sown at each sowing of each variety, and the weight of the yield computed from 66 feet of the two centre rows in each case. The land was prepared as in the turnip test, and was of the same character. The seed did not germinate evenly and the stand was very irregular, making a light yield per acre. The stand was lighter in the early sown plants than in the second series, but the roots were larger and better grown. All were pulled October 22.

MANGELS—TEST OF VARIETIES.

Number.	Name of Variety.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
						Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Giant Yellow Globe	April 25	May 9	Oct. 22	Oct. 22	30	984	1,016	24	16	472	541	12
2	Yellow Intermediate	" 25	" 9	" 22	" 22	27	912	915	12	9	480	308	..
3	Mammoth Long Red	" 25	" 9	" 22	" 22	27	648	916	48	16	1,264	554	24
4	Triumph Yellow Globe	" 25	" 9	" 22	" 22	24	1,104	818	24	10	1,658	360	58
5	Giant Sugar Mangel	" 25	" 9	" 22	" 22	21	240	704	..	13	1,192	453	12
6	Perfection	" 25	" 9	" 22	" 22	19	148	635	48	13	1,984	466	34
7	Half Long Sugar White	" 25	" 9	" 22	" 22	19	16	633	36	13	1,060	451	..
8	Prize Winner Yellow Globe	" 25	" 9	" 22	" 22	18	1,356	622	36	19	1,204	653	24
9	Selected Yellow Globe	" 25	" 9	" 22	" 22	18	696	641	36	13	4	433	24
10	Mammoth Yellow Intermediate	" 25	" 9	" 22	" 22	17	1,904	598	24	13	928	448	48
11	Lion Yellow Intermediate	" 25	" 9	" 22	" 22	16	826	547	16	13	1,984	666	24
12	Prize Mammoth Long Red	" 25	" 9	" 22	" 22	15	96	501	36	14	248	471	48
13	Gate Post	" 25	" 9	" 22	" 22	14	248	470	48	7	784	246	24
14	Leviathan Long Red	" 25	" 9	" 22	" 22	13	1,984	466	24	12	1,872	451	12
15	Giant Yellow Intermediate	" 25	" 9	" 22	" 22	13	268	137	48	11	1,760	396	..
16	Selected Mammoth Long Red	" 25	" 9	" 22	" 22	12	1,344	422	24	7	1,576	259	36
17	Golden Giant	" 25	" 9	" 22	" 22	12	288	404	48	13	796	446	36
18	Half Long Sugar Rosy	" 25	" 9	" 22	" 22	10	1,272	354	32	8	1,160	286	..

EXPERIMENTS WITH SUGAR BEETS.

Eight varieties of sugar beet seed were sown alongside the mangels. The soil was of the same nature and the preparation was the same. Two sowings of each sort were made, but the seed did not germinate sufficiently in any of the plots to admit of any estimate as to their relative productiveness.

POTATOES.

Forty-six varieties of potatoes were tested this year. The land was sandy loam which had been heavily dressed with barn-yard manure in the spring of 1903 and sown to pease. It was fall-ploughed last fall and harrowed every few days from early in the spring until May 12, when the potatoes were planted. They were planted in drills thirty inches apart and the sets one foot apart in the drill. They were har-

rowed three times before they were well up, which with the harrowing given the ground before planting, left the land pretty clean and cultivation with the horse hoe and two sprayings with Bordeaux mixture, one on July 8, the other three weeks later, was all the treatment given until they were dug. The yields in most cases are very fair and the quality is excellent. There was no rot in any of the varieties. Four rows of one hundred feet each were planted, and the yield calculated from the weight obtained from sixty-six feet of the two centre rows. The seed used was in each case medium sized, smooth potatoes cut in two strong eyes in each set. All were dug September 20 and 21.

POTATOES—TEST OF VARIETIES.

Number.	Name of Variety.	Total Yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour.
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Enormous	572	..	486	12	85	48	Long, white.
2	Uncle Sam	528	..	475	20	52	40	Round, white.
3	Daniel's Sensation	519	12	441	20	77	52	Oval, white.
4	Rose No. 9	492	48	443	..	49	48	Long, rose.
5	Rawdon Rose	479	36	408	..	71	36	"
6	Sabean's Elephant	471	08	376	08	95	..	Long, flat, white.
7	Holborn Abundance	457	36	411	57	45	45	Round, white.
8	Country Gentleman	456	30	366	30	90	..	Long, pink and white.
9	I.X.L.	453	12	371	42	81	30	Long, flat, pink.
10	Seedling No. 7	448	48	399	18	49	30	Long, red.
11	Empire State	440	..	352	..	88	..	Long, pink and white.
12	Rochester Rose	435	36	348	..	87	36	Long, rose.
13	Cambridge Russet	435	36	345	..	99	36	Oblong, russet.
14	Prolific Rose	431	12	323	12	108	..	Oblong, rose.
15	Clay Rose	426	48	341	18	85	30	"
16	General Gordon	422	24	336	54	84	30	Oval, pink.
17	Reeves' Rose	422	24	340	48	81	36	Long, rose.
18	Early St. George	419	40	358	04	61	36	Long, white.
19	Pearce	415	16	334	16	81	..	Long, pink and white.
20	Swiss Snowflake	409	12	328	..	81	12	Long, white.
21	Vick's Extra Early	404	48	325	18	79	30	Round, pale rose.
22	State of Maine	402	36	301	36	101	..	Long, pink.
23	American Wonder	396	20	317	..	79	20	Long, flat, white.
24	Late Puritan	393	48	324	..	78	48	Long, white.
25	Early Rose	391	36	274	08	117	28	Oblong, rose.
26	Sutton's Invincible	390	30	292	54	97	36	Long, white.
27	New California	389	..	311	..	78	.	Round, white.
28	Dreer's Standard	378	24	255	54	113	30	Oval, white.
29	Penn Manor	376	12	319	42	56	30	Long, red.
30	Blue Beauty	366	36	275	..	91	36	Oval, blue
31	Everett	361	8	316	..	45	08	Oblong, red.
32	Carman No. 1	356	44	285	20	71	24	Round, white.
33	Sutton's Supreme	334	24	267	24	67	..	Long, white.
34	Delaware	325	36	244	06	81	30	Round, white.
35	Burnaby Seedling	320	52	272	52	48	..	Long, rose.
36	American Giant	312	24	250	..	62	24	Long, white.
37	Canadian Beauty	308	00	246	..	62	..	Long, flat, pink.
38	Bovee	305	48	244	18	61	30	Long, rose.
39	Early Andes	290	24	217	54	72	30	Round, rose.
40	Carman No. 3	288	12	201	42	86	30	Oblong, white.
41	Irish Cobbler	270	36	216	36	54	..	Round, white.
42	Maule's Thoroughbred	237	36	142	36	95	..	Long, rose.
43	Early Envoy	226	36	156	56	69	40	Long, pink and white.
44	Moneymaker	215	36	167	36	48	36	Long, white.
45	Early White Prize	206	48	155	18	51	30	Oblong, white.
46	Pingree	176	..	106	..	70	..	"

Cattle in Pasture, Experimental Farm, Agassiz, B.C. [By Frank T. Shutt.]

CUT VERSUS WHOLE SEED POTATOES.

A test was made as to the relative merit and cost of large and medium small cut seed and medium sized whole sets. The plots were arranged as in the uniform test plots, drills thirty inches apart and in the case of the cut sets one foot apart in the drills, and in the whole sets they were eighteen inches apart in the drill.

Two plantings were made in each case, the first April 12, and the second April 25.

Plots 1 and 2A.—The seed was cut from large potatoes and the sets were fairly large and each had not less than three eyes, and weighed on an average about 1 ounce each.

Plots 1 and 2B.—The seed was cut from smooth even average sized potatoes and the sets were cut to two eyes each, and would average about ¾ oz. each.

Plots 1 and 2C.—The sets were whole, smooth, even-sized potatoes, averaging from 2½ to 3½ oz. each.

All were dug September 21, at which time the tops were ripened and dead.

Name of Variety.	Planted.	Total Yield per Acre.	Yield per Acre of Marketable.	Yield per Acre of Unmarketable.	Weight of Seed per Acre.
		Bush. Lbs.	Bush. Lbs.	Bush. Lbs.	Lbs.
Rose No. 9, plot 1 A; cut seed, large sets	April 18	620 18	474 ..	146 18	1,090
" " 2 A " " "	" 25	572 ..	436 ..	136 ..	1,040
" " 1 B; cut seed, 2 eyes to sets	" 18	591 16	510 16	81 ..	780
" " 2 B " " "	" 25	545 36	451 36	94 ..	760
" " 1 C; large, whole sets	" 18	786 24	600 ..	186 24	2,100
" " 2 C " " "	" 25	673 ..	519 ..	154 ..	2,048

SUMMARY OF CROPS.

	Tons.	Lbs.
Hay	114	1,900
Corn for ensilage and	67	..
Clover in silo	56	..
Turnips	17	600
Mangels	8	1,000
Carrots	2	..
Oats	7	1,000
Pease	3	800
Wheat	1	500
Barley	2	1,000
Potatoes	4	..

FODDER PLANTS.

The following millets and other fodder plants were tested on plots of one-fortieth of an acre each.

The millets were sown April 22, but as only about ten per cent of the seed germinated, the plots were ploughed and sown with rape :—

Plot 1.—Italian Millet.
Plot 2.—Pearl Millet.
Plot 3.—Hungarian Millet.
Plot 4.—Green California.
Plot 5.—White Round.
Plot 6.—Penicillaria.

HORSE BEANS.

Three plots of horse beans were sown April 25.

Plot 7, sown in drills 21 inches apart; seed did not germinate evenly. Growth poor, stalks about 20 inches long, not well podded. Weight when cut 2 tons 840 lbs.

Plot 8, 28 inches apart in the drill; stalks 24 to 30 inches long; not many pods; weight when cut 2 tons 1,620 lbs.

Plot 9, 35 inches apart in the drill; pods 2 to 2½ inches long; not well filled; weight when cut 2 tons 1,080 lbs.

These plots were badly infested with aphis early in August, which doubtless reduced the yield; cut October 10 to October 31.

Soja Beans.—These make a better growth on our warm sandy soil than the horse bean, and as they branch freely, and have a great deal of foliage, as well as many pods, the cattle, horses, pigs and sheep are very fond of them, and on rich land fairly heavy crops can be raised, but clover can be grown so much more cheaply and more feed per acre can be got from clover, that it does not pay except under exceptional conditions to raise Soja beans, especially as the seed seldom ripens sufficiently to be of use.

Three plots were sown April 25 and harvested October 10, at which time a fair percentage of the pods contained seeds in a nearly matured state.

Plot 10, sown at 21 inches apart in the drill; a fair even stand; well podded and very leafy; pods 1 to 1¼ inches long, containing from 1 to 3 seeds each; stalks 24 to 30 inches, and well branched; weight when cut 4 tons 400 lbs.

Plot 11, sown at 28 inches apart in the drill; well podded; very leafy and well branched; pods more matured than where closer together in the drills; weight when cut 4 tons 1,160 lbs.

Plot 12, sown at 35 inches apart in the drills; a fine stand; stalks 30 to 40 inches long; well branched and very leafy; well podded and the pods and seeds more mature than those on the plots where the drills were closer together; weight when cut 4 tons 1,040 lbs. per acre.

CLOVER VERSUS CORN FOR ENSILAGE.

As the weather in June is so often showery, that hay is very difficult to harvest and as clover makes good ensilage, it was thought desirable to compare the crop of an acre of average clover, with an acre of corn. Clover had been seeded in the spring of 1903, and immediately after the wheat crop with which it was grown had been harvested a dressing of about ten tons per acre of barn-yard manure was applied, direct from the stable as fast as it was made, and in spring was harrowed to break up the manure.

The first cutting was made June 20, a bright clear day, and the crop was hauled direct to the barn, weighed and put into the silo. The second crop was cut August 3 and put into the silo. The first cutting weighed 13 tons 273 pounds, second cutting, 12 tons 1,450 pounds, making a yield of 25 tons 1,723 pounds per acre.

One acre of Compton's Early corn, which is one of the best for this locality, planted May 20 and cut October 8, when in roasting ear weighed 19 tons 1,840 pounds, making a difference of nearly six tons per acre in favour of clover. There is a difference in favour of the clover in the cost of production and also in the condition in which the land is left for further cropping.

GARDEN VEGETABLES.

RADISHES.—Sown April 11.

Early Scarlet Turnip. Fit for use, May 8. Crisp, sweet.
Olive-shaped Scarlet. Fit for use, May 12. Crisp.
French Breakfast. Fit for use, May 20. Very good.

LETTUCE.—Sown April 12.

Big Boston. Fit for use, May 18. Crisp, tender.
Nonpareil Cabbage. Fit for use, May 20. Fine heads, sweet and crisp.
Deacon. Fit for use, May 24. Solid, crisp, sweet.
All the Year Round. Fit for use, May 28. Solid, fine quality.

CARROTS.—Sown April 12.

French Horn. Fit for table, June 9. Very sweet and crisp.
Half Long Scarlet Nantes. Fit for table, June 20. Fine flavoured.
Luc Half Long. Fit for table, July 8. Very sweet, crisp.
Long Scarlet Altringham. Fit for table, July 20. Crisp; sweet; good.

TABLE TURNIPS.—Sown April 10.

Early White Milan. Fit for table, June 10. Very sweet and fine.
Early Snowball. Fit for table, June 14. Rapid grower, good quality.
Red Top Strapleaf. Fit for table, June 14. Rapid grower, very mild.
Hazard's Swede. Fit for table, July 28. Very sweet and fine flavoured.

ONIONS.—Sown April 4.

Extra Early Flat Red. Uniform size; mild, firm, sweet, very good.
Large Red Wethersfield. A fine cropper, solid, smooth, mild, good.
Yellow Globe Danvers. Medium size, solid, mild, good.

CABBAGE.—Sown in beds in open ground April 10, and transplanted May 19.

Eureka. Fit for table, July 11. Heads small; solid, crisp, fine flavour. A good header.

Express. Fit for table, July 14. Heads small; medium solid; fine, crisp, sweet.

Extra Early Midsummer Savoy. Fit for table, July 20. Heads soft and open.

New Early Flat Head. Fit for table, July 30. Heads medium size, firm, solid, white, fine flavour.

Charleston Wakefield. Fit for table, July 30. Heads fine size, very solid, white, crisp, good.

Early Winningstadt. Fit for table, August 16. Heads rather open and soft, but quality good.

Green Globe Savoy. Fit for table, September 10. Heads solid, medium size, very sweet, good.

Fielderkraut. Fit for table, September 24. Heads medium size; not solid, but white; crisp, sweet, fine flavour.

Fottler's Drumhead. Fit for table, October. A fine uniform header; solid, crisp, and an excellent winter cabbage.

Quintal Drumhead. Fit for table, October. Heads large, but not firm and solid.

Fottler's Improved Brunswick. Fit for table, October. A regular header. Heads flat, solid, crisp, good, and an excellent keeper.

Danish Ball Head. Fit for table, October. Heads round, solid, medium size; a good keeper and of superior quality.

Marblehead Mammoth. Fit for table, October. Not a sure header; a coarse, strong grower, but not of fine quality for table.

Mammoth Red Rock. Fit for table, October. Heads solid and very dark red, fine, crisp, sweet, very good.

Large German Savoy Drumhead. Fit for table, October. A uniform Leader; very solid, crisp, sweet, delicate flavour, and a good keeper.

CAULIFLOWERS.—Sown April 12; transplanted May 19.

Extra Early Selected. Fit for table, July 20. Heads extra fine, large, solid, very white, sweet.

Half Early Paris. Fit for table, July 26. Heads small, compact, crisp, and very good.

Early Snowball. Fit for table, July 30. A uniform header; heads large, firm, very fine, crisp, delicate.

BROCOLI.—Sown April 12 and transplanted May 19.

Extra Early White. Fit for table, August 24. A uniform header; heads large, firm, white, flavour delicate, and good.

BRUSSELS SPROUTS.—Sown April 12 and transplanted May 19.

Dwarf Improved. A fine grower, and well furnished with solid, crisp sprouts.

BEETS.—Sown April 28.

Crimson Globe. Fit for table, July 13. A fair size, crisp, sweet, and very dark red.

Egyptian. Fit for table, July 20. An even, rapid grower of very fine flavour.

Early Blood Turnip. Fit for table, July 20. A crisp, sweet, fine flavoured dark red beet.

Long Smooth Blood Red. Fit for table, September. Very fine quality; sweet, crisp and good; a good keeper.

BEANS.—Planted May 1.

Dwarf Golden Skinless. Ripe, July 13. A dwarf grower; very productive; pods 2½ to 4 inches long; crisp; stringless, and of good quality.

Extra Early Edible Podded. Ripe, July 15. A dwarf grower; productive; pods 4 to 5 inches long; quality good.

Royal Dwarf Kidney. Ripe, July 16. A bushy grower; fairly productive; tender and of pleasant flavour.

Crystal White Wax. Ripe, July 19. A bushy grower; fairly productive; pods 4 to 5 inches long; plump, crisp, and of good flavour.

Fame of Vitry. Ripe, July 20. A strong grower; productive; pods 4 to 6 inches long; crisp, tender, of pleasant flavour, good.

Dwarf Emperor of Russia. Ripe, July 20. A bushy, strong grower; very productive; pods 4 to 5 inches long; crisp, and of very fine flavour.

Dwarf Inexhaustible. Ripe, July 22. Very dwarf; bushy; productive; pods 3 to 5 inches long; crisp, of very pleasant flavour, good.

Dwarf Black Speckled. Ripe, July 24. Dwarf; bushy; productive; pods 4 to 6 inches long; fleshy, crisp, juicy, and of very pleasant flavour.

GARDEN PEASE.—Sown April 4.

Sutton's May Queen. Fit for table, June 18. Pods 2 to 3 inches long; well filled; pease of medium size; good quality; productive.

Alaska. Fit for table, June 18. Vines well podded; pods well filled with pease of fine flavour and quality.

American Wonder. Fit for table, June 20. Vines short, and well furnished with long, well filled pods of sweet, fine-flavoured pease.

Nott's Excelsior. Fit for table, June 22. A fine cropper, and fine-flavoured pease.

Premium Gem. Fit for table, June 24. Vines 2 feet long, and productive; pods long, and well filled.

McLean's Advancer. Fit for table, June 30. Vines 24 to 30 inches long; well podded; pease of medium size, and very fine quality.

Gradus. Fit for table, July 2. Vines 30 to 36 inches long, and well furnished with long, well filled pods; pease large, sweet and good.

Heroine. Fit for table, July 4. Vines 20 to 24 inches long; a fine producer; pods long, well filled; pease large, and very superior in quality.

Sutton's Conqueror. Fit for table, July 7. Productive; pods long, well filled with large pease of very fine quality.

Duke of Albany. Fit for table, July 10. Fairly productive; pods long, and well filled with medium large pease of very fine flavour.

Admiral. Fit for table, July 11. Vines long and productive; pease large, tender, and of fine quality.

Rent Payer. Fit for table, July 11. Vines of medium length; pods long, and well filled with large pease of superior flavour.

New Dwarf Telephone. Fit for table, July 15. Vines short, but very productive; pease large, sweet, and of fine flavour.

Stratagem. Fit for table, July 15. Vines short; productive; pods long, and well filled; pease large, very sweet, and of fine quality.

Sutton's Perfection. Fit for table, July 18. Vines 12 to 18 inches long, stout and productive; pease large and fine flavoured.

Sutton's Late Queen. Fit for table, July 20. Vines productive; pods containing 5 to 10 large, sweet peas.

Squash.—Planted May 7.

Crookneck. Ripe, August 10. Poor growth, but productive.

Faxon. Ripe, August 10. Growth uneven; productive; squash flat, 6 to 10 inches in diameter; flesh solid, and of good quality.

Boston Marrow. Ripe, August 15. Growth feeble; productive; squash 10 to 15 inches long, 4 to 7 inches in diameter; flesh yellow, rich and sweet.

Hardshell Marrow. Ripe, August 15. Growth medium; productive; squash from 9 to 15 inches in length, 5 to 7 inches in diameter; flesh orange; thick, good; very fine quality.

Chicago Orange Marrow. Ripe, September 4. Growth vigorous; productive; squash oval, 10 inches by 8; flesh thick, rich, sweet, good.

Fordhook. Ripe, September 8. Growth feeble; productive; squash 6 to 10 inches in length, 7 to 9 inches in thickest part; flesh orange; very fine quality.

Essex Hybrid. Ripe, September 10. Growth medium; not productive.

Delicata. Ripe, September 10. Growth vigorous; very productive; squash 10 to 12 inches long and 4 to 5 inches in diameter; skin thin, yellow, streaked with dark green; flesh light yellow, firm, thick, of very good quality; a good keeper.

English Vegetable Marrow. Ripe, September 10. Growth medium; productive; squash 10 to 12 inches long, 4 to 6 inches in diameter; flesh pale yellow; quality fair.

Michigan. Ripe, September 15. Growth feeble; productive; squash 6 to 12 inches long, 3 to 4 inches in diameter; colour dark green; flesh solid, of very good quality; similar in size, shape and style of growth to Delicata.

Golden Hubbard. Ripe, September 15. Growth feeble; productive; squash of fair size, and of good quality.

Delicious. Ripe, September 20. Growth fair; productive; squash 5 to 8 inches from stem to blossom, and 4 to 8 inches in diameter; skin dark green; flesh orange thick, solid, of very good quality; a winter squash.

Sweet Corn.—Planted April 20.

Prémo. Fit for table, August 2. Ears 4 to 6 inches long; kernels deep, sweet, and of fine flavour.

First of All. Fit for table, August 4. Ears 4 to 6 inches long, well filled to tip; corn sweet and finely flavoured.

Cory Sugar. Fit for table, August 4. Productive; ears well filled with deep, large kernels of sweet, rich, full flavoured corn.

SAMPLES DISTRIBUTED.

A large number of sample packages of grain, potatoes, nuts and other tree seeds and scions were distributed to farmers by mail in response to applications received from them. From the reports received it is evident that this work is productive of much good.

Packages of scions and cuttings	238
3 lb. samples of potatoes	164
3 " oats	153
3 " pease	120
3 " spring wheat	86
3 " barley	74
Nut and tree seeds, bulbs, &c.	599
	1,444

CORRESPONDENCE.

Letters received, 2,942; letters despatched, 2,772.

APPLES.

The spring was not a good one for fruit, as the weather during the blossoming time was showery and cold, and a light frost during this period caused much of the fruit to fall, but owing to fine, bright weather during the late summer and autumn, the fruit developed well and coloured finely, and the quality has been very good, and the crop of most varieties a medium one. No new sorts have been planted this year, but a good many varieties have fruited for the first time. Only those which were sufficiently matured to describe their quality as well as the outside appearance have been described.

The following is a list of the summer and fall apples fruiting for the first time. While many of these will doubtless prove of little value here, yet there are some that on further test, may prove to be of merit in their season.

1. *Earliest of All.*—Tree a spreading, straggling grower, and not productive. Fruit small, oblate, roundish. Stem short. Calyx small, closed. Basin shallow. Skin greenish yellow. Flesh whitish, juicy, firm, sprightly acid, of poor quality. Nothing to recommend it. Ripe last of July.

2. *Thomas Rivers.*—Tree a vigorous grower. Fruit of medium size, conical. Stem medium length, cavity deep, and narrow. Calyx small, closed. Basin narrow and deep. Skin clear, bright yellow. Flesh white, coarse, not very juicy, pleasant, mild, sub-acid or nearly sweet. Season August.

3. *September Beauty.*—Tree a poor grower. Fruit of medium size, conical. Stem short, cavity narrow and deep. Calyx small and closed. Basin shallow and narrow. Skin greenish yellow, with a bright red cheek and many whitish dots. Flesh yellowish, crisp, not very juicy, a sprightly pleasant acid. Season early August.

4. *Lord Sudely.*—Tree a moderate grower. Fruit medium to large, oblate conical. Stem short, cavity narrow and deep. Calyx small, closed. Basin narrow, deep and

furrowed. Skin clear yellow, nearly overspread with bright red, and sprinkled with many gray dots. Flesh yellowish, a little coarse grained, crisp, juicy, mild pleasant sub-acid, slightly vinous, good. Season August.

5. *Domino.*—Tree a strong grower, and an early bearer. Fruit large, conical. Stem of medium length. Cavity narrow and deep. Calyx large, closed. Basin deep, narrow and furrowed. Skin pale whitish yellow, with a bright red blush and a few brown dots. Flesh white, crisp, a little coarse grained, juicy, mild, pleasant flavour, sub-acid. Season August.

6. *White Pineating.*—Tree a slow grower. Fruit small, round, flattened; stalk long and slender; cavity narrow and deep, calyx small, closed; basin narrow and deep; skin yellow, with a faint blush on sunny side. Flesh crisp, not juicy, mild and of pleasant flavour; not valuable; season August.

7. *Yellow Calville.*—Tree a strong grower. Fruit of medium size, globular; stem short and stout. Cavity moderately deep and wide. Calyx small, closed. Basin shallow and narrow. Skin a clear, glossy, yellow with a little pale red on the sunny side. Flesh white, a little coarse, crisp, juicy, of a mild, pleasant flavour, sub-acid. Season August.

8. *Belle du Havre.*—Tree a thrifty grower and an early producer. Fruit above medium size, roundish, conical. Stem long. Cavity wide and deep. Calyx large, closed, Basin wide, deep and corrugated. Skin pale yellow with a bright red cheek and sprinkled with brown dots. Flesh white, crisp, fine-grained, juicy with a pleasant flavour, good. Season August.

9. *Greenup's Pippin.*—Tree a vigorous grower. Fruit of medium size, globular, with uneven sides. Stem medium in length, slender. Cavity deep and narrow. Calyx small, closed, set in a narrow deep basin. Skin clear yellowish green, with a dull red cheek. Flesh white, juicy, sprightly, tender, nearly sweet, with a pleasant flavour. Season August.

10. *Early Rivers.*—Tree a strong grower. Fruit medium to large, conical. Stem long. Cavity shallow and narrow. Calyx small, closed. Basin, small, shallow and corrugated. Skin greenish yellow. Flesh whitish, a little coarse, granular, juicy, a mild, pleasant flavour, acid, a fine cooking apple. Season August.

11. *Tyra Mostbirne.*—Tree a vigorous grower. Fruit of medium size, globular, Stem short. Cavity deep and narrow. Calyx large, closed. Basin wide and deep, corrugated. Skin greenish yellow, with streaks and splashes of deep red on the sunny side. Flesh whitish, crisp, juicy, a little coarse and a little granular, a mild pleasant acid. Season August.

12. *Dutch Codlin.*—Tree a strong grower. Fruit large, roundish, ribbed from stem to calyx. Stem long. Calyx large. Basin shallow. Flesh white, coarse, mildly acid. Moderately juicy. A good cooking apple. Season, August.

13. *Barchard's Seedling.* Tree a vigorous grower and productive. Fruit of medium size, oblate, conical. Stalk short. Cavity small. Calyx small, open. Basin narrow and deep. Skin greenish yellow, with stripes and patches of bright red over nearly the whole surface. Flesh white, fine grained, juicy of a mild, pleasant flavour, sub-acid, good. Season, late August.

14. *C. H. R. Starr.*—Tree a moderate grower. Fruit small roundish, oblate. Stalk long. Cavity narrow and shallow. Calyx small, closed. Basin narrow and shallow. Skin yellow, with a bright red cheek. Flesh whitish, juicy, sub-acid, a little coarse, of a mild pleasant flavour. Season, September.

15. *Lady Derby.*—Tree a strong grower. Fruit medium to small, oblate. Stem short. Cavity deep and wide. Calyx small, closed. Basin wide and deep. Skin clear, bright yellow with stripes and splashes of bright red on the sunny side. Flesh yellowish, fine grained, crisp, juicy, acid, and of a pleasant flavour. Season, September.

16. *Bijou.*—Tree a vigorous grower. Fruit of medium size, roundish oblate. Stem long. Cavity narrow and shallow. Calyx large, closed. Basin wide and shallow. Skin yellow, nearly overspread with dull red. Flesh yellowish, crisp, moderately juicy, mild, pleasantly acid, with a fine rich flavour. Season, September and October.

17. *Sugar Loaf Pippin.*—Tree a slow grower. Fruit below medium size, oblong, conical. Stalk short, often with a fleshy knob at the side. Calyx small, closed. Basin narrow and deep. Skin clear bright yellow. Flesh yellowish, crisp, juicy, mild, sub-acid or nearly sweet, with a pleasant flavour. Season, September.

18. *Grand Sultan.*—Tree a strong, upright, spreading grower. Fruit large, oblong, conical. Stem short. Cavity narrow and deep. Calyx small, closed. Basin deep, moderately wide and deeply corrugated. Skin yellow, nearly covered with dull red. Flesh white, a little coarse, fairly juicy and mildly sub-acid. Season, September.

19. *De Moisson.*—Tree a vigorous grower and an early bearer. Fruit of medium size, conical. Stem short. Cavity narrow and deep. Calyx small, closed. Basin deep and narrow. Skin greenish yellow, with a dull red cheek. Flesh white, crisp, juicy and pleasantly sub-acid. Season, September.

20. *De Lait.*—Tree a poor grower. Fruit above medium size, oblong, conical. Stem short. Cavity narrow and deep. Calyx large, closed. Basin wide and deep. Skin pale yellow, with a few stripes and patches of bright red. Flesh white, crisp, juicy, sprightly acid, with a pleasant flavour, good. Season, September.

21. *Oscin.*—Tree a strong grower. Fruit medium to large, oblong, oval, stem short, cavity narrow and deep, calyx, large, closed. Basin narrow and deep. Skin greenish yellow, with sometimes a faint blush and a few whitish dots. Flesh whitish, crisp, moderately juicy, briskly sub-acid, with a pleasant flavour. Season, September.

22. *Anis Rise (Niemetz).*—Tree a strong grower and a free producer. Fruit above medium size, globular, somewhat conical. Stem of medium length. Cavity shallow and wide. Calyx small, closed. Basin deep and narrow. Skin pale yellow, with sometimes a few narrow stripes, on sunny side. Flesh white, juicy, crisp, sprightly, tender pleasantly acid, good. Season September.

23. *Bottle Stopper.*—Tree a medium grower. Fruit below medium size, oblong, tapering to eye. Stalk short. Cavity wide and shallow. Calyx large, closed. Basin narrow, shallow and corrugated. Skin green, with many white dots. Flesh white, juicy, sprightly, rather corky. Season September. Quality poor.

24. *Scinde Centre.*—Tree a strong grower. Fruit above middle size, oblong, conical. Stalk short. Cavity deep and narrow. Calyx large, closed. Basin wide and deep. Skin whitish yellow, with streaks and spots of bright red over nearly the whole surface. Flesh coarse, white, crisp, juicy, sprightly, pleasantly acid. Season September.

25. *Kieve Reinette.*—Tree a vigorous grower. Fruit large, oblate, tapering to the eye. Stem short. Cavity narrow and deep. Calyx small, closed. Basin narrow and deep. Skin yellowish white, finely mottled with streaks and patches of red in two shades. Flesh white, a little coarse, moderately juicy, nearly sweet, pleasant. Season September.

26. *White Pilkanoff.*—Tree a strong grower. Fruit of medium size, globular, conical. Stem short and slender. Cavity narrow and shallow. Calyx small, closed. Basin deep and narrow. Skin yellowish white, with a few small patches and stripes of bright red). Flesh white, crisp, a little coarse, juicy, mild and pleasantly acid. Season September.

27. *Duchess of Brabant.*—Tree a vigorous grower. Fruit medium to large, oblong, conical. Stalk medium. Cavity deep and narrow. Calyx small, closed. Basin shallow and narrow. Skin greenish white, with stripes of dark red on the sunny side, and sprinkled with gray dots. Flesh white, tender, juicy, crisp, with a pleasant, sprightly flavour; a very good cooking apple. Season, September and October.

28. *Lady Henniker.*—Tree a strong grower and an early producer. Fruit above medium size, roundish, a little conical, ribbed. Stalk short. Cavity wide and deep. Calyx large, open. Basin deep and deeply ribbed. Skin yellow, with a faint red blush, and a few gray dots. Flesh white, tender, moderately coarse, granular, juicy, mild and pleasantly acid. Season October to December.

29. *Lamb Abbey Pearmain.*—Tree a strong grower. Fruit of medium size, oblate, slightly conical. Stalk short. Cavity narrow and deep. Calyx moderately open. Basin shallow and flat. Skin yellow, nearly covered with red in two shades. Flesh white, juicy, crisp, sprightly, sub-acid. A splendid apple for sauce or baking. Season October and November.

30. *Jefferson.*—Tree a medium grower. Fruit small, round, oblate. Stem short. Cavity narrow and deep. Calyx small, closed. Basin wide and deep. Skin clear yellow, with a bright red cheek. Flesh whitish, not juicy, mildly acid, not valuable. Season October.

31. *Harvey's Wiltshire Defiance.*—Tree a strong grower. Fruit of medium size, oblate tapering to calyx, irregularly ribbed. Stem of medium length. Cavity narrow and deep. Calyx small, closed. Basin shallow and flat. Skin greenish-yellow with a bronze cheek and many russet dots, and a few small patches of russet. Flesh yellowish, firm, crisp, juicy, sweet. Season October and November.

32. *The Vicar.*—Tree a strong grower. Fruit small, roundish oblate. Stem slender, of medium length. Cavity deep and narrow. Calyx large, closed. Basin wide and deep, corrugated. Skin yellow with a bright orange blush. Flesh white, moderately juicy, mild and pleasantly acid. Season September and October.

33. *James Grieve.*—Tree a vigorous grower. Fruit of medium size, roundish, oblate, tapering slightly to the eye. Skin yellowish-white with sometimes a little dull red on sunny side. Flesh white, juicy, tender with a pleasant flavour, nearly sweet. Season October and November.

34. *Prince Lippe.*—Tree a strong grower. Fruit medium to small, oblate, conical. Stalk short. Cavity narrow and deep. Calyx small closed. Basin of medium width and deep. Skin greenish-yellow striped with dull red over nearly the whole surface and sprinkled with small gray dots. Flesh greenish-white, crisp, juicy, fine grained, mild and of pleasant flavour, refreshingly acid, quality good. Season November to January.

35. *Rose.*—Tree a weak grower. Fruit small, flat. Stem slender. Cavity narrow and deep, skin greenish yellow nearly overspread with dull red, with many small whitish dots. Flesh white, not juicy or of fine flavour, nearly sweet. Quality poor. Season, October and November.

36. *Scotch Bridget.*—Tree a vigorous grower. Fruit of medium size, conical, stalk long, cavity wide and deep, calyx small, closed, basin small and corrugated, skin greenish yellow. Flesh white, soft, juicy and pleasantly acid. A good cooking apple. Season, October and November.

37 *Pioneer.*—Tree a feeble grower. Fruit of medium size, globular, a little flattened, stalk short, cavity wide and shallow, calyx small, closed, basin wide and shallow, skin yellow with a few gray dots. Flesh whitish yellow, juicy, tender, crisp with a pleasant aromatic flavour, sub-acid. Season, October and November.

38. *Schoolmaster.*—Tree a very poor grower. Fruit of medium size, roundish oblate. Stalk medium. Cavity narrow and deep. Calyx small, closed. Basin wide and shallow, skin greenish yellow with a red blush on the sunny side, and a few gray dots. Flesh, white, juicy, crisp, sprightly with a pleasant flavour. Season, October and November.

39. *Mrs. Barron.*—Tree a moderate grower. Fruit of medium size, conical. Stalk long. Cavity narrow and deep. Calyx small, closed. Basin shallow and narrow. Skin greenish yellow with a dark red cheek. Flesh white, firm, juicy, crisp and sprightly acid; a good cooking apple. Season, October and November.

40. *Striped Beaufin.*—Tree a vigorous grower. Fruit large, roundish, oblate, heavily ribbed. Stalk short. Cavity narrow and shallow. Calyx large, closed. Basin wide and deep. Skin greenish yellow, with a dull red cheek and many gray dots. Flesh yellowish, firm, juicy, mildly acid. Season, October and November.

41. *Queen Caroline.*—Tree a poor grower. Fruit medium to large, oblate, roundish. Stalk short. Cavity narrow and deep. Calyx small, closed. Basin deep and wide. Skin greenish yellow, with a slight blush and many gray dots. Flesh crisp, juicy, a little coarse, mildly acid. Season, October and November.

42. *Court of Wick.*—Tree a strong grower. Fruit small, conical. Stalk slender. Cavity narrow and deep. Calyx large, open. Basin shallow. Skin greenish orange, with many gray dots and a little reddish blush in the sun. Flesh yellow, crisp, juicy, with a rich aromatic flavour, mildly acid. Quality good. Season, October and November.

43. *G. H. Wright.*—Tree a vigorous grower. Fruit of medium size, oblate. Stalk short. Cavity narrow and deep. Calyx small, closed. Basin of medium width and depth. Skin yellow, with a few russet dots and russet about calyx. Flesh white, tender, granular, not juicy, mildly sub-acid. Season, October and November.

44. *Smith's Seedling.*—Tree a strong grower. Fruit small, oblate. Stalk short. Cavity narrow and shallow. Calyx small. Basin shallow. Skin greenish yellow with a few whitish dots. Flesh white, firm, moderately juicy, a mildly pleasant acid. Season October and November.

45. *Arthur.*—Tree a vigorous grower. Fruit medium to small, oblong, globular. Stalk short. Cavity deep and narrow. Calyx small, closed. Basin narrow. Skin golden yellow, with sometimes a bright red blush. Flesh yellowish, granular, juicy, mildly acid, with a pleasant flavour. Season, November.

46. *Duncan.*—Tree a slow grower. Fruit of medium size, oblate conical. Stalk long. Cavity deep and narrow. Calyx large, open. Basin wide and shallow. Skin greenish yellow with a small dull red blush in the sun. Flesh greenish, white, tender, crisp, juicy, mild and pleasantly sub-acid. Season, November and December.

47. *Seaton House.*—Tree a very moderate grower. Fruit large, flat. Stalk short. Cavity deep and wide. Calyx large, closed. Basin wide and shallow. Skin greenish yellow splashed with clear bright red. Flesh white, crisp, moderately juicy, mildly acid. Season, November.

48. *Gibbin's Russet.*—Tree a strong grower. Fruit small, flat. Stem short. Cavity narrow and deep. Calyx small. Basin deep and narrow. Skin russet yellow. Flesh juicy, fine grained, mildly acid with a pleasant flavour. Season, November and December.

49. *Peter.*—Tree a strong grower. Fruit of medium size, globular, tapering slightly to eye. Stalk long, slender. Cavity narrow and of medium depth. Calyx small, closed. Basin moderately wide and deep. Skin yellow, nearly entirely overspread with dark and light red. Flesh crisp, juicy, a mild pleasant acid. Season, November and December.

50. *Landsburg Reinette.*—Tree a vigorous grower. Fruit medium to large, oblate. Stalk medium. Cavity deep and wide. Calyx small, closed. Basin narrow and deep. Skin orange yellow, with a faint red blush. Flesh yellowish, moderately juicy, tender with a pleasant flavour nearly sweet. Season, November and December.

51. *Walton Abbey Seedling.*—Tree a slow grower. Fruit large, roundish, slightly conical. Stem short. Cavity medium in depth. Calyx small, closed. Basin narrow and deep. Skin yellow, with a dull red blush and a few russet dots and russet about the stalk. Flesh white, fairly juicy, fine grained, tender, mildly sub-acid. Quality good. Season, November and December.

52. *Evagil.*—Tree a strong grower. Fruit of medium size, roundish globular. Stalk long. Cavity wide and deep. Calyx large, closed. Basin wide and deep. Skin

greenish yellow, with many gray dots. Flesh yellowish, crisp, juicy, mild and pleasantly acid. Season, November and December.

53. *Coos River Beauty.*—Tree a strong grower. Fruit large, oblate, conical, somewhat ribbed. Stalk short. Cavity wide and of medium depth. Calyx medium, open. Basin narrow, deep and corrugated. Skin bright yellow. Flesh white, coarse, not very juicy, mild and pleasantly acid. Season, November and December.

54. *Kingston Black.*—Tree a vigorous grower. Fruit of medium size, conical. Stalk short. Cavity narrow and shallow. Calyx small, closed. Basin deep and wide. Skin yellow, nearly overspread with deep red and freely sprinkled with small whitish dots. Flesh white, firm, not juicy, mildly acid. Season, November and December.

55. *Siegfried.*—Tree a vigorous grower. Fruit medium to large, oblate, roundish. Stem short. Cavity narrow, funnel-shaped. Calyx large, closed. Basin wide and deep. Skin yellow with a dull red cheek. Flesh greenish white, tender, juicy, sprightly with a pleasant flavour. Season, November to January.

56. *Forge.*—Tree a strong grower. Fruit of medium size, oblong, oval. Stalk short. Cavity, narrow and deep. Calyx small, closed. Basin deep and corrugated. Skin pale yellow, splashed and mottled with two shades of red. Flesh yellowish white, tender, juicy, pleasantly sub-acid. Season, November and December..

57. *Kronish Rosy.*—Tree a vigorous grower. Fruit small, conical. Stalk medium. Cavity narrow and shallow. Calyx small, closed. Basin narrow and shallow. Skin greenish yellow with a little dull red on sunny side. Flesh yellowish, crisp, juicy, mildly acid, nearly sweet, with a pleasant flavour. Season, November to January.

58. *Hermead's Pearmain.*—Tree a vigorous grower. Fruit of medium size, oblong conical. Stalk short. Cavity deep and narrow. Calyx large. Basin wide and shallow. Skin yellow, with a faint blush on sunny side. Flesh white, tender, crisp, juicy, sub-acid, with a good and pleasant flavour. Season, November.

59. *Bramlot.*—Tree a strong grower. Fruit small, conical. Stem short. Cavity wide and shallow. Calyx large. Basin shallow and flat. Skin yellow, with a bright red cheek. Flesh white, coarse, not juicy, a bitter sweet, suitable for cider. Season, November.

60. *Williams' Russet.*—Tree a strong grower. Fruit medium or below medium in size; oblong, globular, tapering a little to the eye. Stalk short. Cavity wide and deep. Calyx large, closed. Basin wide and deep. Skin russet yellow with a pink red cheek. Flesh whitish, tender, juicy, mildly acid, with a pleasant aromatic flavour. Season, November to January.

61. *Betty Geeson.*—Tree a medium grower. Fruit large, oblate, ribbed, angular. Stalk short. Cavity wide and deep. Calyx large, open. Basin wide and deep and heavily ribbed. Skin yellow with a small red blush. Flesh whitish, crisp, firm, moderately juicy, of a mild, pleasant acid character. A good cooking apple. Season, November and December.

62. *Siegende Reinette.*—Tree a medium grower. Fruit large, roundish, globular. Stalk short. Cavity shallow and wide. Calyx small, closed. Basin of medium width and deep. Skin greenish russet with a dull red cheek and many whitish dots. Flesh whitish, fine, tender, moderately juicy, with a pleasant aromatic flavour, sub-acid. Season, November and December.

63. *Royal Russet.*—Tree a strong grower. Fruit above medium size, oblate conical. Stalk short. Cavity deep and narrow. Calyx large, closed. Basin small. Skin greenish yellow, nearly overspread with a fine russet. Flesh white, crisp, tender, fine grained, with a rich, high flavour, nearly sweet. Season, November to January.

64. *Reinette de Canada.*—Tree a strong grower and an early bearer. Fruit above medium size, conical. Stalk long. Cavity medium deep and wide. Calyx large, closed. Basin wide and moderately deep. Skin greenish yellow, with a red cheek and

a few yellowish dots. Flesh white, fine grained, juicy, of a brisk, pleasant, acid character. Quality good. Season, November and December.

65. *Pigeon Gris.*—Tree a vigorous grower. Fruit of medium size, conical. Stalk short. Cavity narrow and shallow. Calyx small, closed, narrow and shallow. Skin greenish yellow with a fine russet over the surface. Flesh white, fine grained, moderately juicy, with a rich, pleasant flavour; nearly sweet. Season, November to January.

66. *Tom Putt.*—Tree a strong grower. Fruit medium to large, globular, conical. Stem medium, and cavity medium in width and depth. Calyx large, open. Basin deep, narrow and corrugated. Skin pale yellow with a small blush in the sun. Flesh white, a little coarse and rather dry; not of fine quality. Season, November and December.

67. *Colville Blanche d'Hiver.*—Tree a strong grower. Fruit of medium size, roundish, conical. Stem short. Cavity deep and wide. Calyx large, closed. Basin wide, deep and deeply ribbed. Skin yellow with a faint blush in the sun. Flesh yellowish white, fairly juicy, not of high quality. Season, November to January.

68. *Yellow Arkad.*—Tree a strong grower. Fruit medium to large, oblate, conical, heavily ribbed. Stalk short. Cavity narrow and shallow. Calyx large, open. Basin deep and wide and heavily ribbed. Skin yellow with a mottled red blush and many white dots. Flesh whitish, coarse, juicy, pleasantly sub-acid. Season, November and December.

69. *Swinsevka.*—Tree a vigorous grower. Fruit medium to large, conical. Stem short. Cavity narrow and deep. Calyx small, closed. Basin shallow and narrow. Skin greenish yellow, with a bright handsome red cheek, and sprinkled with many white dots. Flesh white, a little coarse, juicy, mildly sub-acid, with a pleasant flavour. A fine cooking apple. Season, November and December.

70. *Aunt Ginnie.*—Tree a strong grower. Fruit of medium size, conical, irregular, ribbed. Stalk short. Cavity deep and narrow. Calyx moderately open. Basin deep and narrow. Skin yellow, nearly covered with stripes and patches of light and dark red, with a little russet about the stalk. Flesh greenish white, tender, crisp, fairly juicy, mildly sub-acid, with a pleasant flavour. Season, November and December.

71. *Ringer.*—Tree a vigorous grower. Fruit above medium size, roundish, flattened. Stalk short. Cavity moderately deep and wide. Calyx small, closed. Basin narrow and shallow. Skin greenish yellow, with sometimes a faint blush, and many gray dots. Flesh yellowish, crisp, firm, juicy, pleasantly acid. A very fine cooking apple. Season, November and winter.

72. *Gospatrick.*—Tree a medium grower. Fruit below medium size, oblong conical. Stalk short. Cavity narrow and deep. Calyx large, closed. Basin narrow and deep. Skin yellow, with a red cheek in the sun. Flesh white, crisp, of fine texture, juicy, mildly sub-acid, with a very pleasant flavour. Season, November and December.

73. *Small's Admirable.*—Tree a vigorous grower. Fruit of medium size, oblate conical. Stalk long, slender. Cavity narrow and shallow. Calyx small, closed. Basin narrow and of medium depth. Skin greenish yellow, with russet about the cavity, and sprinkled with russet dots about the eye. Flesh white, juicy, mild, crisp, fine grained, nearly sweet, and of a delicate flavour. Season, November and December.

74. *Gray French Reinette.*—Tree a strong grower. Fruit small, roundish conical. Stem short. Cavity deep and narrow. Calyx large, closed. Basin wide and corrugated. Skin greenish russet. Flesh whitish, juicy, with a rich pleasant flavour; sub-acid. Season, November and December.

75. *Jacques Lebel.*—Tree a strong grower. Fruit above medium size, roundish oblate. Stalk short. Cavity small. Calyx small, closed. Basin narrow and shallow. Skin rich yellow, with a dull red cheek, and many gray dots. Flesh white, fine grained, tender, of a mild, pleasant acid character. Season, November and December.

76. *Cooper's Seedling.*—Tree a feeble grower. Fruit small, roundish globular. Stalk long. Cavity wide and shallow. Calyx large, closed. Basin wide and shallow. Skin greenish yellow, with a purple red cheek and a few gray dots. Flesh white, crisp, moderately juicy, mildly sub-acid, with a pleasant flavour. Season, November and December.

77. *Ornament de Table.*—Tree a poor grower. Fruit below medium size, oblate. Stalk short. Cavity narrow and deep. Calyx large, partly open. Basin wide and flat. Skin yellow, with sometimes a red cheek. Flesh yellowish, juicy, tender, mildly sub-acid, with a pleasant flavour. Season, December.

78. *Lord Hindlip.*—Tree a vigorous grower. Fruit small, globular. Stalk medium. Cavity wide and shallow. Calyx small, closed. Basin wide and deep. Skin pale yellow, nearly covered with russet and sprinkled with gray dots. Flesh yellowish, tender, juicy, nearly sweet, with a fine aromatic flavour. Season, November to January.

79. *Muscat Reinette.*—Tree a poor grower. Fruit small, roundish conical. Stalk short. Cavity narrow and shallow. Calyx small, closed. Basin small. Skin yellow, striped with red. Flesh yellowish, fine-grained, juicy, rich and aromatic, mildly sub-acid. Season, November and December.

80. *Calville Grand Duke Frederic de Bade.*—Tree a strong grower. Fruit large, roundish globular, somewhat ribbed. Stalk short. Cavity narrow and deep. Calyx large, closed. Basin wide and deep. Skin greenish yellow, with stripes of pale red on sunny side. Flesh yellowish, coarse, tender, of pleasant flavour; of a mild, sprightly, acid character. Season, November, December and January.

81. *Reinette de Dippedalle.*—Tree a medium grower. Fruit of medium size, oblong, globular, slightly tapering to the eye. Stalk short. Cavity deep and narrow. Calyx large, open. Basin wide, deep and deeply ribbed. Skin golden yellow, with a small blush in the sun and many gray dots. Flesh white, firm, not very juicy, slightly aromatic, nearly sweet. Season, November and December.

82. *Carter.*—Tree a moderate grower. Fruit small, roundish, oblate. Stalk short. Cavity wide and shallow. Calyx large, closed. Basin wide and flat. Skin yellow, with a few small stripes of dull red. Flesh tender, juicy, sub-acid, with a pleasant flavour. Season, November to January.

83. *Nonsuch.*—Tree a strong, spreading grower. Fruit medium to large, roundish. Stem short. Cavity deep and narrow. Calyx large, open. Basin wide and deep. Skin greenish yellow with a dull red cheek. Flesh white, soft, moderately juicy and pleasantly acid. Season, November and December.

84. *Fiessers Erstling.*—Tree a moderate grower. Fruit of medium size, conical. Stalk short. Cavity deep and narrow. Calyx large, closed. Basin narrow, deep and corrugated. Skin yellow with a deep red cheek. Flesh white, juicy, vinous, sub-acid. Season, November and December.

85. *Reinette de Middlebourg.*—Tree a strong, upright grower. Fruit of medium size, oblong, tapering a little to the eye. Stalk short. Cavity narrow and deep. Calyx small, closed. Basin wide and shallow. Skin greenish yellow, with many gray dots, and a small blush on sunny side. Flesh white, fine-grained, tender, crisp, juicy, of a mild, pleasant acid character. Season, December to January.

86. *Hoover.*—Tree a moderate grower. Fruit of medium size, roundish. Stalk long, cavity deep. Calyx large, open. Basin furrowed. Skin yellow, striped with light and dark red, with a little russet about stem. Flesh yellowish, firm, fine-grained, juicy, sub-acid, with a fine flavour. Season, November and December.

87. *Green Crimean.*—Tree a vigorous, spreading grower. Fruit above medium size, conical. Stalk short. Cavity wide and shallow. Calyx large, open. Basin narrow and shallow. Skin yellow, mottled with stripes and patches of dull red, with russet about the stalk. Flesh yellowish, a little coarse, juicy, sprightly and mildly acid. A good cooking apple. Season, November and December.

88. *Scarlet Nonpareil.*—Tree a slow grower. Fruit small, oblate, flattened. Stalk medium. Cavity deep and wide. Calyx large, closed. Basin wide, shallow. Skin yellow, with a red cheek, and a few whitish dots. Flesh yellowish white, firm, juicy, mildly sub-acid. Season, November and December.

89. *Egremont Russet.*—Tree a vigorous grower. Fruit of medium size, roundish oblate. Stem short. Cavity narrow and shallow. Calyx large, closed. Basin narrow and shallow. Skin clear golden yellow, with a little russet in basin. Flesh white, firm, juicy, fine grained, rich, sugary, with a pleasant vinous flavour. Season, December.

90. *Rymer.*—Tree a moderate grower. Fruit of medium size, roundish oblate. Stalk short. Cavity small. Calyx large, closed. Basin wide and shallow. Skin glossy yellow, with a bright blush. Flesh yellowish, juicy, firm, crisp, sub-acid, with a pleasant flavour. Season, December.

Many of the apples above described as in season during November and December, while fit for the table at that time, are evidently good keepers, and some will no doubt prove valuable as late varieties on further test.

Many of the trees planted in the older orchards having fruited for a number of years, and their relative value pretty well tested, have been removed. In some cases the varieties were poor in quality, in others the trees were unthrifty or unproductive, but as the main object in planting trees on the Experimental Farm is to test their suitability and value for our climate and conditions, a few years' trial after a tree begins fruiting determines its quality and relative usefulness, when, if it is found inferior or lacking in any of the qualities which characterize a first-class fruit, it is removed to make way for other more desirable or untried sorts. A partial list of those which have been removed is appended.

American Pippin.
American Summer Pearmain.
Anis.
Anisovka.
Antonovka.
Aport Grell.
Aport (252).
Aport (23).
Arabka (257).
Arabka.
Arabka Winter.
Arabskoe.
Arkad Solovieff.
Arkansas Beauty.
Autumn Strawberry.
Avenarius.
Bailey Sweet.
Baraboo.
Basil the Great.
Baxter.
Ben Davis.
Bismarck.
Bombshell.
Bottle Greening.
Bradfords Best.
Cabashea.
Canada Baldwin.
Carolina Red June.
Carthouse.
Chenango Strawberry.
Colvert.
Danvers Winter Sweet.
Dickinson.
Dutch Mignonne.
Dwyer.
Early Harvest.
Early May.
Early Ripe.
Excelsior.
Fairmount.
Fallawater.
Fall Jenetting.
Fall Orange.
Fall Wine.
Fameuse.
Fraser River Beauty.
Gideon.
Gideons (No. 26).
Gipsy Girl.
Gracie.
Grandmother.
Green Stripe.
Green Harvest.
Haas.
Hastings.
Hawley.
Hominy
Isham Sweet.
Jacob Sweet.
Kantil Sinap.
Kara Sinap.
Keswick Codlin.
Lanes Sweet.
Large Anis.
Long Arcade.
Lowell.
Magog Red Streak.
Manks Codlin.
Margil.
Mayne Island.
McMahon White.
Melonen.

Milden.
Naliv Ansjutin.
Newton.
No. 181 Budd.
Onondaigua.
Orel No. 1.
Orel No. 5.
Orel No. 6.
Ostrakoff (472) Beadle.
Paperovka.
Parson Sweet.
Persian Bogdanoff.
Pewaukee.
Plodovitka Koslov.
Plums Cider.
Pointed Pipka.
Queen Olga.
Red Astrachan.
Red Bietigheimer.
Red Juneating.
Red Queen.
Red Streak.
Rolfe.
Romenskoe.
Rosy Repka.
Rosy Voronesh.
Royal Table.
Russian Preserve.
Russet Henrys.
Russet Pewaukee.
Russian Tyrol.
St. Lawrence.
Scott's Winter.
Shannon.
Silken Leaf.
Simbirsk No. 4.
Simbirsk No. 5.
Skirsch.
Smokehouse.
Sommitelnoe.
Striped Anis.
Summer Queen.
Summer Red Streak.
Sweet Bough.
Taffets Winter.
Talman Sweet.
Tetofsky.
Titovko Schovieff.
Trenton.
Twenty Ounce.
Ukraine.
Utter's Large Red.
Volga Anis.
Walbridge.
Warner's King.
Washington.
Waxen.
Waxy, Juicy.
Wellington.
Western Beauty.
White Cardinal.
Winter St. Lawrence.
Yellow Ingestre.
York Imperial.

PEARS.

The trees are vigorous and healthy, but they have borne very little fruit at Agassiz. They were full of bloom in spring and looked very promising for a crop, but the April frost caught them just when the fruit was setting, and very few varieties bore any fruit. The following sorts, which have been reported on in previous reports, gave a small crop again this year; Beurre Bosc, Bartlett, Emile d'Heyst, La France, Dr. Jules Guyot and the Keiffer. These were the only old trees which bore fruit. The following sorts fruited for the first time this year :—

1. *Elliott's Early.*—Tree a strong grower. Fruit below medium size, obtuse, pyriform. Stalk ¾-inch long. Cavity shallow. Calyx small, open. Basin shallow. Skin yellow, with a clear red cheek and many gray dots and a little russet about stalk. Flesh, juicy, sweet, tender, somewhat granular; not high flavoured. Season, last of July.

2. *Saint Michael Archangel.*—Tree a medium grower. Fruit above medium size, oblong, pyriform. Stalk stout. Cavity small. Calyx medium, open. Basin shallow and corrugated. Skin pale yellow, splashed with russet and sprinkled with greenish dots. Flesh white, juicy, sweet, tender, aromatic. Season, October and November.

3. *Beurre Spae.*—Tree a strong grower. Fruit large, roundish, pyriform. Stalk of medium length and fleshy at junction. Calyx small and open. Skin yellow, with a little russet, and sprinkled with gray dots. Flesh yellowish, melting, very juicy, sweet, perfumed. Season, October and November.

4. *Daimyo.*—Tree a strong grower. Fruit small, ovate, pyriform. Stalk long, slender and fleshy at junction. Calyx small, open. Basin narrow, deep. Skin yellowish green, with a little russet, and a few russet dots. Flesh coarse, juicy, firm. A cooking pear. Season, November.

5. *Goat-herd.*—Tree a strong grower. Fruit small, acute pyriform. Stem one inch long, no cavity. Calyx large, open. Basin narrow and shallow. Skin greenish russet with a dull red cheek and many gray dots. Flesh white, juicy, buttery, sweet. Season, September.

6. *Charneau.*—Tree a slow grower. Fruit small, long, acute pyriform. Stalk one inch long, curved. Calyx small, open. Basin shallow and narrow. Skin russet with a bronze reddish cheek. Flesh yellowish, juicy, melting, sweet. Season, September and October.

7. *Marum Flask.*—Tree a poor grower. Fruit large, oblong, pyriform. Stalk ¾-inch long, set inclined and with a fleshy knob. Calyx large, open, no basin. Skin yellow. Flesh white, sweet, pleasant, moderately juicy. Season, October.

8. *Lincoln of Illinois.*—Tree a moderate grower. Fruit above medium size, oblong, pyriform. Stalk long. Calyx open. Skin yellowish green. Flesh yellowish, juicy, almost sweet. Season, October.

9. *Prince Imperial.*—Tree a moderate grower. Fruit of medium size, obtuse pyriform. Stalk short, stout. Calyx small, open. Basin wide and deep. Skin clear yellow with small patches of russet and many gray dots. Flesh yellowish, juicy, buttery, sweet, very good. Season, October.

PLUMS.

The plums, like the pears, suffered from the cold rains in April and from the frost. Very few of the older trees bore fruit this year. Many of the trees of the orchard planted in the spring of 1890 have been removed. Some of them were unproductive, some very subject to rot, and others too small or poor in quality.

The following varieties are new to this country, and have fruited for the first time:—

1. *Bonne de Bry.*—Tree a strong grower. Fruit below medium size, globular, with a shallow suture, terminating in a slight depression. Skin dark purple, with a heavy whitish blue bloom. Flesh greenish, juicy, sweet, tender. Stone very small and free. Very fine for canning. Season, last of July.

2. *St. Etienne.*—Tree a strong grower. Fruit below medium size, globular. Stalk ¾-inch long. Suture well defined, ending in a small basin, one side enlarged. Skin bright orange, with a whitish bloom and a crimson blush. Flesh yellow, firm, juicy, sweet, with a fine flavour. Stone small, free. Season, last of July.

3. *Reine Claude d'Althan.*—Tree a strong grower. Fruit very small, round. Stem, ½-inch long, set in a small depression. Skin bright clear red, with a whitish bloom. Flesh yellowish, fine grained, not juicy. Stone small, cling. Not valuable. Season, early August.

4. *Climax.*—Tree a strong grower. Fruit large, obtuse, heart-shaped. Stalk short. Cavity small. Calyx well marked. Skin deep red, sprinkled with small golden dots. Flesh yellowish, sweet, juicy, fine grained, with a pleasant flavour. Season, first of August.

5. *Yellow Imperatrice.*—Tree a strong grower. Fruit above medium size, roundish oval, with a distinct suture. Skin clear golden yellow, with a little red in streaks about stalks. Flesh yellowish, juicy, sweet, tender, with a very fine flavour. Cling stone. Season, early August.

6. *Reine Claude Davion.*—Tree a strong grower. Fruit small to medium, roundish oval. Stalk short. Suture well marked. Skin dull greenish yellow, with a few reddish dots, and spots on sunny side. Flesh yellowish, fine grained, juicy, sweet, with a fine rich flavour. Stone small, cling. Season, August.

7. *Prince of Wales.*—Tree a strong upright grower. Fruit large medium, oval shape. Stalk ¾-inch long, and set in a slight depression, with a well defined suture.

Skin bright reddish purple, with many yellow dots. Flesh yellowish, juicy, firm, sprightly. Cling stone. Season, August.

8. *Mirabelle Grosse.*—Tree a strong grower. Fruit below medium size. Round, smooth, yellow, with a few crimson dots. Flesh yellow, juicy, sugary, with a very fine flavour. Stone small, free. Season, August.

9. *Early Red.*—Tree a slow grower. Fruit below medium to small, oval. Stalk short set in a small cavity, and a well defined suture ending in a slight depression. Skin dull red with a thin whitish bloom, and sprinkled with golden dots. Flesh yellowish, juicy, a little coarse, with a pleasant flavour. Season, September.

10. *Autumn Compote.*—Tree a vigorous grower. Fruit medium to large oblong oval, with one side enlarged. Stalk long, and set in a small cavity. Skin pale dull yellow, with a thin whitish bloom. Flesh yellowish, a little coarse, juicy, sprightly, with a pleasant flavour. Season, September.

11. *Giant.*—Tree a strong grower. Fruit of medium size, oblong, with a neck. Stalk short. Suture distinct, and one side enlarged. Skin red, with a whitish bloom. Flesh yellowish, juicy, fine-grained, tender, sweet. Stone small, nearly free. Season September.

12. *White Bullace.*—Tree a strong grower. Fruit small, round. Stem short. Skin yellowish white, mottled with red in the sun. Flesh firm, juicy and sweet. A cling stone. Season last of September.

13. *Cheshire Damson.*—Tree a vigorous grower. Fruit small, round. Stalk short. Skin dark purple, covered with a thick bluish bloom. Flesh greenish, firm, juicy, sprightly and pleasant. Season last of September.

CHERRIES.

The cherry trees were full of bloom early in April and some of the sweet cherries set a fair crop, but the continued showery weather in May and June prevented effective spraying, and the rot was severe, and the showers and sunshine during the time of ripening caused much of the sound fruit to split. So severe was this cause of loss that on two trees which were fairly well loaded with ripening fruit, not more than five per cent were sound, this by count of the fruit on several well loaded branches.

The following sorts fruited for the first time this year:—

1. *Kentish.*—Tree a slow grower. Fruit large, flattened at top and bottom. Stalk short. Skin clear deep shiny red. Flesh yellowish white, juicy, sub-acid, and when allowed to hang on the tree until very ripe has a rich pleasant flavour mildly acid. Season last of June.

2. *Grosse Griotte du Vin.*—Tree a healthy grower. Fruit of medium size, roundish, much flattened. Stalk long. Skin very dark glossy red. Flesh and juice dark red, juicy, mild, sprightly acid, with a pleasant flavour. Season July.

3. *Bohemian Black Bigarreau.*—Tree a strong grower. Fruit large, roundish, heart shaped. Stalk short and stout. Skin glossy black. Flesh black, with dark red juice; firm, juicy, rich, sweet, with a very fine flavour. Season July.

4. *Wragg.*—Tree a strong grower. Fruit of medium size, oval. Stalk long, set in a narrow cavity. Skin dark glossy red. Flesh red, with dark red juice; rich, with a pleasant flavour, mildly acid. Stone small. Season July.

5. *Cluster Black Heart.*—Tree a strong grower. Fruit medium to small, heart-shaped. Stalk long. Skin glossy black. Flesh and juice very dark red. Flesh tender, juicy, mild and pleasantly acid. Season July.

6. *Early Juicy.*—Tree a strong grower, but late and unproductive. Fruit of medium size, roundish. Stalk long, slender and set in a slight depression. Skin clear glossy red. Flesh yellowish, tender, juicy, nearly sweet. Season July.

7. *Griotte Acher.*—Tree a medium grower. Fruit of medium size, heart-shaped. Stalk long, set in a narrow basin. Skin dark glossy red. Flesh and juice red. Flesh tender, juicy, nearly sweet, with a pleasant flavour. Season late July.

8. *Guigne Choque.*—Tree a medium grower. Fruit above medium size, oblong oval. Skin yellowish-red. Flesh juicy, sweet with a pleasant flavour. Stone large. Season July.

9. *Bigarreau Mongin.*—Tree a medium grower. Fruit of medium size, heart-shaped. Skin clear glossy yellow with a bright red cheek. Stalk long, set in a deep basin. Flesh yellowish-white, tender, juicy, sweet with a pleasant flavour. Season July.

10. *Chatenay.*—Tree a weak and slow grower. Fruit small, heart-shaped. Stalk very long set in a narrow basin. Skin yellowish-red with dark red dots. Flesh whitish, juicy, sprightly, not valuable. Season early August.

PEACHES AND APRICOTS.

There are only a few trees of these fruits left on the Experimental Farm and these bore no fruit. The peach trees now growing here are perhaps too young to bear much, and the apricots bloom too early and have never borne much fruit.

QUINCES.

The only one of these fruits to bear is the Portuguese, which fruited again this year. Three other varieties blossomed but did not bear fruit.

MEDLARS.

All of the medlar trees fruited this year. There is practically no difference in productiveness or quality of the fruit of the different named sorts, and all make a fine rich jelly.

MULBERRIES.

As in former years the mulberry trees were loaded with fruit.

MOUNTAIN ORCHARDS.

The mountain orchards have made a strong healthy growth and have borne some fruit, plums, apples, pears and medlars, but, as in former years, birds and wild animals eat or destroy much of the fruit.

NUT ORCHARDS.

The Japanese walnut as usual bore a heavy crop of nuts, the Japanese and Spanish chestnuts a fair crop, and the English walnut and the American black walnut a few nuts per tree. A great many applications for nuts to plant are being received and many reports of success with nuts from samples of nuts distributed in previous years are received.

SMALL FRUITS.

The crop of small fruits has been fairly good this year, and a few days earlier than last year. The fruit was not quite so large as usual, which was caused by the dry weather. We have now under test seventy-three varieties of Red and Yellow raspberries. These have all been described in previous reports.

After several years' trial under similar conditions, the following varieties have proved to be the best.

In quality, Sarah is superior to all the others and equal to any in productiveness, but it is not so firm, or so large as the Cuthbert.

RED AND YELLOW RASPBERRIES.

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Phœnix	June 26.	Vigorous	Large	Firm, good quality	Productive.
Pauline	July 1.	"	"	" " continued long in bearing.	"
New Fastolf	" 2.	"	"	Firm, good quality	"
Northumberland Fill Basket.	" 2.	"	Very large	" " continued long in bearing.	"
Duke of Brabant	" 3.	"	Large	Firm, good quality	"
All Summer	" 4.	"	Large medium	" " continued long in bearing.	"
Sarah	" 5.	"	"	Very good quality	"
Lord Beaconsfield	" 7.	"	"	Firm, good quality	"
London	" 7.	"	"	" "	"
Cuthbert	" 8.	"	Large	" "	"
R. B. Whyte	" 8.	"	Large medium	" "	"
French Vice-President	" 8.	"	Very large	" "	"
Golden Queen	" 4.	"	Large	" "	"
Large Yellow	" 6.	"	"	" "	"

BLACK CAP RASPBERRIES.

Nineteen varieties of Black Cap Raspberries are under test. Black Caps require very rich ground. They also require moisture as well as sunshine when the berries are growing and ripening, to ensure a good crop.

The following are the best of those tested here:—

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Nemaha	July 8.	Vigorous	Large	Good quality	Productive.
Palmer	" 8.	"	Large medium	"	"
Older	" 10.	"	"	"	"
Kansas	" 10.	"	"	"	"
Mammoth Cluster	" 10.	"	Large	"	"
Gregg	" 12.	"	"	"	"
Progress	" 12	"	Medium	"	"
Ida	" 12.	"	"	"	"

BLACKBERRIES.

The blackberries gave a fairly good crop this year, there are twenty-nine varieties under test; the following are the best:—

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Early King	July 16.	Vigorous	Large	Good quality	Productive.
Snyder	" 22.	"	Large medium	"	"
Hansel	" 22.	"	Medium	"	"
Stone's Hardy	" 22.	"	Large	Very good quality	"
Eldorado	" 22.	"	"	The very best quality	"
Erie	" 24.	"	"	Good quality	"
Agawam	" 25.	"	Large medium	"	"
Taylor	" 25	"	"	"	"
Taylor's Prolific	Aug. 1.	"	"	"	"
Minnewaska	" 2.	"	"	"	"

RED AND WHITE CURRANTS.

Of the forty-two varieties under test, the following are the best:—

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
La Fertile	July 3.	Vigorous	Large medium	Good quality	Productive.
Pomona	" 3.	"	"	"	"
Raby Castle	" 3.	"	"	"	"
London	" 3.	"	"	"	"
Red Cherry	" 3.	"	Large	"	"
La Conde	" 4.	"	"	"	"
Prince Albert	" 4.	"	Large medium	"	"
White Cherry	" 7.	"	Large	"	"
Large White Brandenburg	" 7.	"	"	"	"
White Pearl	" 8.	"	Medium	"	"
Victoria	" 8.	"	Large medium	"	"

BLACK CURRANTS.

Fifty-one varieties of black currants are under test, of these the following are the best:—

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Dominion	July 10.	Vigorous	Large medium	Good quality	Productive.
Middlesex	" 10.	"	"	"	"
Merveille de la Gironde	" 10.	"	"	"	"
Boskoop Giant	" 10	"	Very large	Very good quality	"
Baldwin	" 10.	"	Large medium	Good quality	"
Prince of Wales	" 10.	"	Large	"	"
London	" 12.	"	Large medium	"	"
Black Naples	" 12.	"	Large	"	"
Lee's Prolific	" 12.	"	Large medium	"	"
Pearce	" 12.	"	"	"	"
Pomona	" 12.	"	Large	"	"
Victoria	" 12.	"	Large medium	"	"
Climax	" 12.	"	"	"	"

GRAPES.

The weather during summer and autumn being dry and warm, the following varieties of grapes ripened, in the order named:—

Jessica.
Delaware.
Saunders' Seedling No. 2.
Saunders' Seedling No. 4.
Moore's Early.
Moyer.
Wyoming Red.
Poughkeepsie Red.
Worden.
Emerald.
Martha.
Brighton.
Wilder.
Pocklington.
Brilliant.
Canada.
Lady.
Champion.
Clinton.
Niagara.

METEOROLOGICAL RECORD.

Date of Highest Temperature.	Temperature.	Date of Lowest Temperature.	Temperature.	Rainfall.	Snowfall.	Sunshine.	
1903.	°		°	Inches.	Inches.	Hours.	Minutes.
December 3	52	December 11 & 27	31	3·31	11	35	18
1904.							
January 3	46	January 18 and 19	15	6·30	4	30	24
February 24	48	February 8 and 9	17	2·86	32	23	..
March 25	63	March 21 and 22	30	5·32	3	73	36
April 14	80	April 29	30	3·46	.. .. ..	139	24
May 22	82	May 1 and 31	35	2·34	.. .. ..	176	30
June 20	88	June 9	37	3·42	.. .. ..	181	30
July 22	93	July 28	43	3·45	.. .. ..	225	36
August 4	90	August 23	41	2·30	.. .. ..	176	12
September 16	81	September 29	36	2·37	.. .. ..	172	36
October 17	78	October 25	36	3·20	.. .. ..	68	18
November 3	67	Nov. 1, 2, 6 & 28	35	6·43	.. .. ..	31	30
		Totals		44·76	50	1,333	54

I have the honour to be, sir,
Your obedient servant,

THOS. A. SHARPE.

STATEMENT OF EXPENDITURE ON THE DOMINION EXPERIMENTAL FARMS, FOR THE YEAR ENDING JUNE 30, 1904.

CENTRAL EXPERIMENTAL FARM.

Live stock			$ 306 11
Feed for stock	$ 680 55		
Supplies from experimental plots	547 11		
Grain screenings from grain distribution	116 12		
	$ 1,343 78		
Less—Supplies to poultry department	253 80		
		1,089 98	
Veterinary services and drugs			205 14
Seeds, grain, trees, &c.	$ 1,655 72		
Less—Value of seeds for grain distribution	$ 281 52		
" trees " tree "	93 37		
" " Arboretum	106 15		
	481 64		
		1,174 68	
Implements, tools, hardware and supplies			1,049 56
Drainage and drain tiles			151 55
Manure and fertilizers for experimental plots and horticultural department			448 17
Travelling expenses			1,738 81
Exhibition expenses			655 95
Blacksmithing, harness supplies and repairs			736 57
Bee department			153 27
Wages: farm work, including salaries of officers in charge			4,708 79
Wages: care of stock, including salary of herdsman			3,377 40
Horticultural division, including salaries of officers in charge, also forestry $841.59			4,971 25
Poultry division, also salaries of officers in charge	$ 2,775 25		
Value of grain, &c., supplied by farm	253 80		
		3,029 05	
Experimental division, including salaries of officers in charge	$ 3,872 78		
Less—Value of material supplied for feed	547 11		
" potatoes supplied for seed distribution	151 00		
	698 11		
		3,174 67	
Care of hedges, avenues, ornamental trees and grounds			1,316 06
Office assistance, including English and French correspondence and messenger service			4,905 11
Printing of office supplies and stationery			1,302 77
Arboretum	$ 1,193 79		
Value of trees from Seeds, grain, trees, &c	106 15		
		1,299 94	
Distribution of trees and tree seeds	$ 177 51		
Value of trees from Seeds, grain, trees, &c.	93 37		
		270 88	
Seed testing and care of green-houses			1,157 97
Dairy branch, including salary of dairyman			849 64
Contingencies			134 83
Telegrams and telephones			244 22
Steers, purchased for feeding experiments			1,792 66
Museum			56 83
Books and newspapers			193 33
		$ 40,094 59	
Less—Proceeds of sale of steers, purchased for feeding experiments		2,875 26	
		$ 37,219 33	

EXPERIMENTAL FARM, NAPPAN, N.S.—EXPENDITURE, 1903-4.

Live stock	$	269 12
Feed for stock		2,422 03
Veterinary services and drugs		65 72
Seed grain, seeds, trees, &c.		444 11
Implements, tools, hardware and supplies		387 98
Manure and fertilizers		411 86
Travelling expenses		316 83
Exhibition expenses		279 21
Blacksmithing, harness supplies and repairs		417 03
Salary of Superintendent		1,500 00
Wages, farm work, including experimental work with farm crops		2,628 47
Wages, care of stock		1,733 75
Poultry branch		99 20
Horticultural division, including experimental work with vegetables, fruits, forest and ornamental trees and flowers; also care of grounds and salary of officer in charge		1,601 13
Distribution of seed grain, potatoes, &c.		173 19
Contingencies, including postage, $149; mail delivery, $97.50		333 85
Printing and stationery		56 11
Books and newspapers		23 92
Telegrams and telephones		54 47
Steers purchased for feeding experiments		927 50
	$	14,085 48
Less—Proceeds of sale of steers purchased for feeding experiments		2,000 16
	$	12,085 32

EXPERIMENTAL FARM, BRANDON, MAN.—EXPENDITURE, 1903-4.

Live stock		$	26 00
Feed for stock			18 50
Veterinary services and drugs			94 10
Seed grain, trees, seeds, &c.			40 95
Implements, tools, hardware and supplies			1,268 67
Travelling expenses			110 49
Exhibition expenses			235 45
Blacksmithing, harness supplies and repairs			507 10
Bee department			71 18
Salary of Superintendent			1,500 00
Wages, farm work, including experimental work, with farm crops, &c.			3,334 28
Wages, care of stock			1,013 75
Horticultural branch, including experiments with vegetables, fruits and flowers; also care of Arboretum and grounds			710 90
Forestry branch, including care of hedges			644 25
Poultry branch			95 65
Office help, including delivery of mail, $148			813 20
Distribution of seed grain, potatoes, &c.			640 66
Distribution of trees and tree seeds			226 97
Contingencies, including postage, $263.15; renewal of bridge across small lake on farm, $350.93; sinking well, $51			683 56
Printing and stationery			165 14
Books and newspapers			19 25
Telegrams and telephones			87 67
Drainage and drain tiles			40 50
Manure and fertilizers			115 00
Steers purchased for feeding experiments			398 30
		$	12,861 52
Less—Proceeds of sale of steers purchased for feeding experiments	$ 580 42		
Value of grain supplied for seed distribution at Ottawa	362 62		
			942 44
		$	11,919 08

EXPERIMENTAL FARM, INDIAN HEAD, N.W.T.—EXPENDITURE, 1903-4.

Live stock		$ 212 00
Feed for stock		58 55
Veterinary services and drugs		103 95
Seed grain, seeds, trees, &c.		90 46
Implements, tools, hardware and supplies		1,398 17
Travelling expenses		112 66
Exhibition expenses		105 75
Blacksmithing, harness supplies and repairs		199 80
Salary of Superintendent		1,500 00
Wages, farm work, including experimental work with farm crops		3,724 70
Wages, care of stock		775 02
Horticultural branch		420 65
Poultry branch		115 54
Forestry branch, including hedges		287 65
Office help, including delivery of mail		750 00
Distribution of seed grain, potatoes, &c		271 08
Distribution of trees and tree seed		120 78
Contingencies, including postage, $669.39		715 04
Printing and stationery		65 91
Telegrams and telephones		42 15
Manure and fertilizers		14 27
Books and newspapers		3 50
Steers purchased for feeding experiments		479 00
	$	11,587 63
Less Proceeds of sale of steers purchased for feeding experiments	$ 785 00	
Value of grain supplied for grain distribution at Ottawa	1,127 35	
		1,912 35
	$	9,675 28

EXPERIMENTAL FARM, AGASSIZ, B.C.—EXPENDITURE, 1903-4.

Live stock	67 13
Feed for stock	47 58
Veterinary services and drugs	4 40
Seed grain, seeds, trees, &c.	99 03
Implements, tools, hardware and supplies	177 99
Manure and fertilizers	137 37
Travelling expenses	181 94
Exhibition expenses	254 54
Blacksmithing, harness supplies and repairs	151 75
Salary of Superintendent	1,500 00
Wages, farm work, including experimental work with farm crops, vegetables, fruit trees, vines, &c	3,018 57
Wages, care of stock	549 00
Poultry branch	65 95
Forestry branch, including care of hedges	216 00
Office help	130 00
Distribution of seed grain, potatoes, &c.	112 80
Distribution of trees and tree seeds	5 13
Clearing land	544 80
Contingencies, including postage, $155.19	213 69
Printing and stationery	18 24
Books and newspapers	20 50
Drainage and drain tiles	15 20
Bee supplies	1 00
Telegrams and telephones	1 50
	7,534 11

SUMMARY OF EXPENDITURE, 1903-04.

Central Experimental Farm	$ 37,219 33
Nappan "	12,085 32
Brandon "	11,919 08
Indian Head "	9,675 28
Agassiz "	7,534 11

*General Expenditure.**

Distribution of seed grain, potatoes, &c., from Central Experimental Farm		$ 4,804 42	
Value of seeds from, seeds, grain, trees, &c.		281 52	
" grain from Brandon	$ 362 02		
" " Indian Head	1,127 35		
" potatoes from Experimental Division C.E.F.	151 09		
	$1,640 37		
Less—Value of screenings charged feed for stock C.E.F.	116 12		
		1,525 24	
			6,610 19
Entomological and Botanical Division, including salaries of officers in charge			4,098 81
Chemical Division, including salaries of officers in charge			4,720 22
Salaries general, including—			
Director, accountant, director's secretary and assistant accountant			6,137 51
			99,999 85
Printing bulletins and distribution of bulletins and reports		7,000 00	
Less—Special sum in estimates for this item		7,000 00	
			99,999 85

*These items are put under "General Expenditure" for the reason that they are incurred for general purposes.

SUMMARY OF STOCK, MACHINERY, IMPLEMENTS, &c., ON HAND DECEMBER 1, 1904.

CENTRAL EXPERIMENTAL FARM, OTTAWA, ONT.

17 Horses	$ 3,415 00
18 Ayrshire cattle	2,085 00
13 Guernsey cattle	1,565 00
14 Durham cattle (Shorthorns)	3,175 00
8 Canadian cattle	950 00
16 Grade cattle	605 00
27 Yorkshire swine	728 00
9 Berkshire swine	340 00
7 Tamworth swine	200 00
70 Grade swine	382 00
28 Shropshire sheep	503 00
12 Leicester sheep	230 00
3 Grade sheep	12 00
Farm machinery and implements	3,071 75
Vehicles, including farm wagons and sleighs	1,079 00
Hand tools, hardware and sundries	1,152 15
Harness	588 45
Dairy department, machinery, &c.	488 50
Horticultural and forestry departments, implements, tools, &c.	658 50
Botanical department, implements, tools, &c.	5 00
Poultry department, 222 fowls	353 00
Poultry department, implements, furnishings, &c.	146 35
Bees and apiarian supplies	436 02
Chemical department, apparatus and chemicals	1,875 00
Books in several departments	572 86
Greenhouse plants, supplies, &c.	2,229 50
Furniture at Director's house	1,100 00
Office furniture and stationery	1,676 25
Experimental flour mill and electric motor	435 00
	30,037 33

EXPERIMENTAL FARM, NAPPAN, N.S.

8 Horses	$ 1,085 00
4 Guernsey cattle	635 00
7 Holstein cattle	370 00
14 Ayrshire cattle	855 00
60 Grade cattle	1,960 00
4 Yorkshire swine	95 00
2 Berkshire swine	45 00
64 Grade swine	300 00
20 Sheep	240 00
77 Fowls	50 50
Bees and apiarian supplies	10 30
Vehicles, including farm wagons and sleighs	416 50
Farm machinery	547 50
Farm implements	207 00
Hand tools, hardware and sundries	363 50
Harness	213 50
Furniture for reception room and bedroom for visiting officials	129 00
Furniture supplies and books for office	85 00
	$ 7,607 80

EXPERIMENTAL FARM, BRANDON, MAN.

13 Horses	$ 1,400 00
3 Ayrshire cattle	175 00
7 Durham cattle	550 00
3 Guernsey cattle	175 00
9 Grade cattle	285 00
1 Tamworth pig	15 00
1 Berkshire pig	15 00
13 Yorkshire swine	90 00
8 Grade swine	30 00
100 Fowls	100 00
Bees and apiarian supplies	131 45
Vehicles, including farm wagons and sleighs	415 00
Farm machinery	2,136 33
Farm implements	728 00
Hand tools, hardware and sundries	654 05
Harness	219 25
Furniture for reception room and bedroom for visiting officials	161 55
Furniture supplies and books for office	287 30
	$ 7,597 93

EXPERIMENTAL FARM, INDIAN HEAD, N.W.T.

12 Horses	$ 1,570 00
35 Durham cattle	1,960 00
23 Grade cattle	830 00
18 Berkshire swine	155 00
19 Tamworth swine	151 00
2 Yorkshire White swine	40 00
66 Fowls	66 00
Bees and apiarian supplies	25 75
Vehicles, including farm wagons and sleighs	551 00
Farm machinery	2,255 33
Farm implements	763 00
Hand tools, hardware and sundries	399 75
Harness	182 75
Furniture for reception room and bedroom for visiting officials	217 00
Furniture supplies and books for office	367 50
	$ 9,534 08

EXPERIMENTAL FARM, AGASSIZ, B.C.

6 Horses	$	650 00
12 Durham cattle		1,600 00
17 Dorset horned sheep		191 00
14 Berkshire swine		129 00
11 Yorkshire White swine		145 00
74 Fowls		68 00
Bees and apiarian supplies		54 75
Vehicles, including farm wagons		193 50
Farm machinery		643 00
Farm implements		104 50
Hand tools, hardware and sundries		137 70
Harness		116 00
Furniture for reception room and bedroom for visiting officials		151 15
Furniture supplies and books for office		124 00
	$	4,307 60

THOS. M. CRAMP, *Accountant.*

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