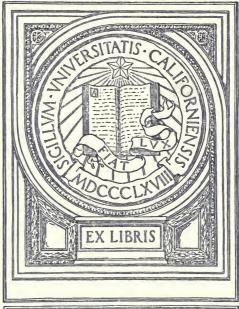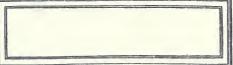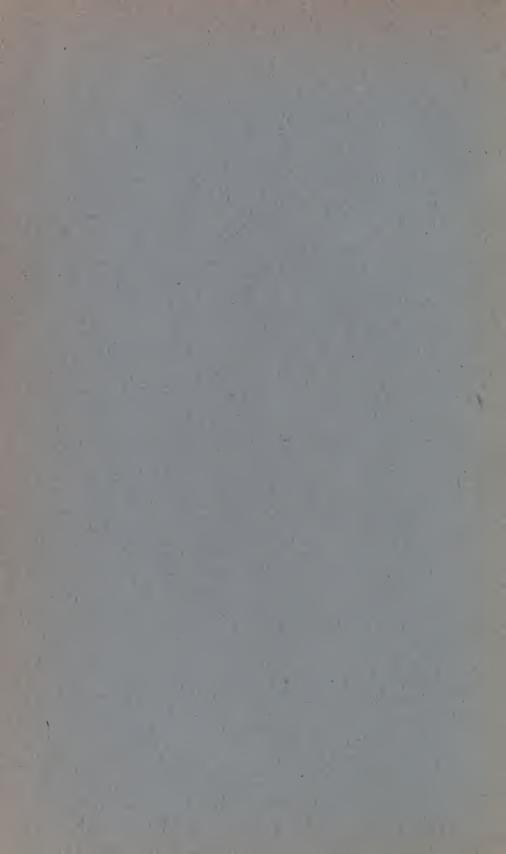PROVINCE OF BRITISH COLUMBIA

DEPARTMENT OF AGRICULTURE

DAIRY FARM SURVEY

Report on One Hundred and Twenty-four Farms in the Arrow Lakes, Chilliwack, Courtenay, Ladner and Salmon Arm Districts

FOR THE YEAR ENDING MAY 1st, 1921

By

H. R. HARE, B.S.A.

Extension Assistant, Department of Animal Husbandry, College of Agriculture, University of British Columbia, Vancouver

COLLEGE OF AGRICULTURE CIRCULAR No. 3

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Introductory

F OLLOWING up the dairy farm survey, which they had inaugurated in 1920, the Department of Animal Husbandry of the University of British Columbia found themselves in a position in 1921 to extend this work of investigation so as to include two new districts. These new districts are Salmon Arm and Arrow Lakes in the interior of British Columbia, the farms of which areas are herein reported upon for the first time in this investigational work. In addition to these sections, the farms in the Chilliwack and Ladner districts in the Lower Fraser Valley, and Courtenay, Vancouver Island, are further studied* and reported upon in this bulletin.

Farmers operate their farms with varying degrees of success. In this report an attempt has been made to determine the factors that make for gain or loss on farms in certain areas within the Province.

In order to get the necessary information, a field-man called on each farmer included in the survey and secured detailed records of each farmer's receipts and expenses for one year. These records included, in addition to the business transacted during the year, an inventory of all livestock, equipment, buildings and land as at the beginning and the end of the year covered in the investigation. The year herein reported upon extended from May 1st, 1920, to April 30th, 1921, and thus may be called the crop year of 1920. The records compiled through the co-operation of the farmers and with the aid of feed houses and creameries that were able to give detailed accounts of the feed the farmers bought and the milk the farmers sold, are the data on which this report is based.

EXPLANATION OF TERMS USED.

Farm Income.—The farm income is the amount of farm receipts left after paying all expenses in connection with the operation of the farm. In the expenses are reckoned wages for all help, including family labour, depreciation on all buildings and machinery, in addition to the other current expenses in connection with the farm. Wages to the operator for his labour are not included in expenses.

Labour Income.—It is recognized that the farmer has a considerable amount of capital invested in his farm, livestock and equipment. Provision must be made for interest on this capital. The farm income is divided into two parts—interest income or income due to interest on investment, and labour income or income due to the labour and managerial ability that the farmer has put into the business during the year. Labour income is then the farm income, less interest on investment. Interest on investment has been calculated at 7% all through this report, except where otherwise stated. No record is made of the farm products used in the house, except in the case of beef and pork. The farmer has had, in addition to his labour income, the eggs, milk, potatoes and garden truck that he has used from the farm. He has also had a house, free of rent, which has been kept in repair. It can be seen, then, that a farmer, whose farm returns him a minus labour income, may still live well and even save money. It may be that he owns his farm and does not have to pay interest, and he may not have paid cash for the family labour which the report allows for. In this case he has not made money by means of his labour, but on his investment, which is due to return him interest, or on his unpaid family help. In cases, however, where he has paid interest and did pay for his family labour and still has shown a minus labour income, and continues to show minus year after year, there are only two avenues of escape from eventual bankruptcy: either he must leave the farm, or so manage his farm business that his labour income will be increased.

Labour income represents the wages the farm returns to the operator for his labour and management of the farm. It is used as a means of comparing

*For earlier study of these districts, see *Agricultural Department Circular No. 36.*

the efficiency of one farm with that of another. Variations in labour incomes are due in many cases to unavoidable circumstances, but largely they are due to factors that come more or less within the farmer's control.

Animal Unit.—A mature cow, or horse, kept on the farm for a year is termed an animal unit. All livestock kept on a farm is reduced to an animal unit basis by comparing the amount each animal consumes with the consumption of a mature cow during one year. Thus a farm having thirty animal units would be one where the total livestock on the farm would consume the same amount of feed as would thirty mature cows in one year.

Livestock Index.—This is a measure of the efficiency of the livestock on the farm. A farm having a livestock index of 100 would be one where the gross receipts from livestock per animal unit are equal to the average gross receipts per animal unit of all farms included in the investigation. A farm having a livestock index of 120 would be one where the gross livestock receipts per animal unit are above the average. A livestock index of seventy-five would indicate that on that particular farm the livestock receipts per animal unit are below average.

Crop Index.—By this index crop yields per acre are expressed. A farm having a crop index of 100 would be one where the yield of crops per acre is equal to the average of all farms in the survey. Higher or lower crop indexes would indicate crop yields above or below the average crop yields.

Dairy Diversity Index.—This denotes the degree of specialization in dairying. A farm having a dairy diversity index of fifty would be one where 50% of the gross receipts of the farm come from the sale of milk, milk products and dairy stock.

Fruit Diversity Index.—This shows the percentage of total farm receipts that come from the sale of fruit.

Tillable Area.—As rough pasture and other untillable land adds to the feeding capacity of the farm, it must be considered in the total tillable area. It is estimated that three acres of rough land or ten acres of pastured woods would produce feed equal to one acre of tillable land. Thus to the tillable area of a farm is added one-third of the rough land and one-tenth of the pastured woods. The total is known as the tillable area of the farm.

Production Efficiency of Cows.—The total digestible nutrients of all feed used on the farm are calculated. The total digestible nutrients per animal unit are then determined. By dividing the total digestible nutrients per animal unit on each farm by the number of pounds butter-fat sold per cow the production efficiency is determined. The production efficiency, then, is the number of total digestible nutrients fed to produce for sale one pound of butter-fat.

DESCRIPTION OF TYPES OF FARMING STUDIED IN THE DIFFERENT DISTRICTS.

Table No. 1.

Districts.	No. of Farms.	Average Actual Acreage in Farm.	Average Tillable Acreage in Farm.	Average Dairy Diversity Index.	Average Livestock Index.	Average Crop Index.	Average % of Total Receipts from Crops.
Arrow Lakes....	18	38	16	17	88	53	43
Courtenay......	21	137	57	70	98	96	6
Salmon Arm....	28	89	61	24	83	89	49
Chilliwack......	26	81	72	78	127	105	7
Ladner.........	12	155	149	66	121	99	26

The business of one hundred and twenty-four farms was investigated, and of these it was found that one hundred and five could be used for all tabulations. Nineteen farms were found to be extreme in certain particulars and could therefore be used in the preparation of only a few of the tables shown in this report.

The farms of the Arrow Lakes are quite scattered and extend along the Lakes from East Robson at the South to Nakusp at the North. This report includes surveys of farms at East Robson, Edgewood, Needles, Burton and Nakusp. From Table No. 1 the farms of this district are shown to be small as compared with those of the other districts. The farmers conduct a fruit-growing business largely, and make a great proportion of their farm receipts from the sale of apples and small fruits. Some farms, however, conduct a considerable dairy business and dispose of this milk locally, to the Nelson or Salmon Arm creameries, or to Revelstoke for city consumption. The yield of farm crops per acre is found to be very low in the Arrow Lakes district during the year.

The Courtenay district is distinctly a dairy district. The farms are of fair size, but quite a large proportion of the acreage is untilled as yet, as is shown in Table No. 1. Owing to their specialization in the dairy business, a very small amount of their receipts come from the sale of crops. The Courtenay creamery supplies a good market for the butter-fat produced. This district includes several farms on Denman Island.

The Salmon Arm area is quite distinctly divided into two parts: the bottom-land farms, used for general dairy farming, and the bench farms, used largely for growing apples, cherries and small fruits. Table No. 1 shows that quite a large percentage of the receipts come from the sale of crops. These crops are grain and hay from the bottom lands and fruit from the benches.

Chilliwack farmers feature the production of butter-fat, as is shown by their high dairy diversity index. A small percentage of the receipts come from the sale of crops. The yield of crops and the quality of the livestock are both high as compared with other districts studied during the year. The butter-fat of this district is handled by the Fraser Valley Milk Producers' Association, which provides a splendid outlet for this commodity.

The Ladner farmers make the large percentage of their receipts from dairy cows. The Fraser Valley Milk Producers' Association provide a market for milk from this area. The farmers, however, sell a considerable quantity of grain and hay. In size of farms, this district surpasses all other districts studied.

AVERAGE YIELD OF CROPS IN TONS PER ACRE, ON FARMS INCLUDED IN THE INVESTIGATION, FOR THE CROP YEAR OF 1920.

Table No. 2.

Crop.	Chilliwack.	Ladner.	Courtenay.	Salmon Arm.	Arrow Lakes.	Average of all Farms.
Wheat (Grain)	1.06	.63	.83	.77	.76	.75
Oats (Grain)	.97	1.01	.84	.98	.48	.97
Barley (Grain)	.45	1.97	1.25	.50	.67	.79
Timothy and Clover Hay	2.33	2.22	2.12	1.73	1.49	2.04
Other Hay	2.49	...	2.12	1.80	1.56	2.14
Grain Crops for Silage	6.76	8.8	3.88	...	...	4.72
Corn for Silage	9.16	7.63	7.11	7.59	6.4	8.28
Clover for Silage	9.02	...	...	...	...	...
Mangels	25.11	24.98	25.9	15.4	4.0	23.7
Turnips	13.39	15.0	26.1	10.0	11.26	19.5
Potatoes	5.81	7.4	6.21	5.74	4.62	6.57

During the year that this investigational work was conducted, livestock values dropped considerably. Between May 1st, 1920, and May 1st, 1921, the inventories of livestock on the average farm indicated a drop of twelve dollars per animal unit.

Labour incomes for the year were found to be lower than those of the previous year, owing largely to the same cause.

Grain prices also fell considerably. The price of oats during the year dropped 50%. This reduced the labour incomes on the grain farms very materially. The drop in prices, along with the heavy loss of crop through fall rains, made the grain farms appear at a disadvantage as compared with other types of farms for the year. The Ladner district suffered a heavy loss on account of the drop in grain prices and fall rains. The fruit farmers of Salmon Arm and Arrow

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Lakes districts sustained heavy loss on account of spring frosts, which caught considerable fruit in blossom. This loss was reflected in their labour incomes, as is shown in Table No. 3.

RESULT OF THE FARMING OPERATIONS BY DISTRICTS.

Table No. 3.

Districts.	Average Size of Farms in Tillable Acres.	Average Total Capital per Tillable Acre.	Average Total Receipts per Tillable Acre.	Average Labour Income Allowing Interest at 7%.	Average Interest on Capital at 7% (or Rent).	Average Labour Income Allowing Interest at 3½%.
Arrow Lakes......	16	$653.54	$93.42	—$235.62	$ 731.96	$130.37
Courtenay.........	57	363.06	67.73	— 17.74	1,279.09	178.58
Salmon Arm.......	61	394.10	59.34	— 28.37	1,607.27	680.08
Chilliwack........	72	422.55	63.37	— 143.53	1,979.82	713.21
Ladner...........	149	357.56	52.67	— 159.75	3,141.70	713.19

Table No. 3 shows, by districts, the average result of the year's operations of the farms studied. The labour income is shown with interest on capital calculated at both 7 and 3½%. All labour incomes show as minus when interest on capital was calculated at 7%, while they all show a plus when interest was allowed at 3½%. This simply indicates that the average returns in all districts were not sufficient to allow the higher rate of interest and still leave a balance as income due to labour.

The farmers of the Arrow Lakes group had small tillable area and a high capitalization per acre. Their receipts were greater per acre, but the size of the farms was not sufficient to bring the total receipts high enough to leave as good returns in labour income as was secured on farms of the other groups which had greater acreage. This disadvantage will be lessened as more land is cleared. The farms of this district show the greatest minus labour income at 7% and the smallest labour income at 3½%. It has been previously stated that the fruit farmers of this district suffered a loss owing to spring frosts. In the other districts the amount of the minus labour incomes, when interest was calculated at 7%, increased in proportion to the size of the farms. This was probably due to one of two causes: either the land values were too high, or too high a rate of interest was allowed on the valuation. The valuation of farms was based upon current selling prices of farms in the various districts. It is realized that the farmer who does the greatest amount of business should receive best returns. Table No. 3 shows that, with the exception of the farms of the Arrow Lakes district, the increased total farm business did not increase the return in labour income when interest on capital at 7% was allowed. When the rate of interest was calculated at 3½%, the returns as shown in labour income increased as did the size of the business. Table No. 3 proves, then, that on the farms studied during the year the average farmer did not make interest on his investment at 7%. The best farms of the various districts did make more than an interest income, even when 7% interest on investment was allowed, as in their case considerable farm income was left. This farm income appears as labour income in Table No. 4.

Table No. 4.

Districts.	Average Size of Farms in Tillable Area.	Average of Five Best Labour Incomes Allowing 7% Interest on Capital.
Arrow Lakes.............	16	$ 364.35
Courtenay...............	57	1,604.53
Salmon Arm.............	61	1,637.04
Chilliwack..............	72	1,352.86
Ladner.................	149	382.56

The average tillable area of the best farms of the Arrow Lakes district is much below that of other districts. Considerable acreage is yet to be cleared. Along with this handicap, spring frosts reduced fruit yields. A combination of the two factors resulted in low returns on even the best farms in this district. In the Ladner district, the greatly reduced returns, as compared with Courtenay, Salmon Arm and Chilliwack, were chiefly due to fall rains and drop in grain prices.

The Dairy Farming Business in General

Dairy farming and fruit farming were the two distinct types of farming investigated during the year. As the factors which make for success or failure in these two types of farming are very different from one another, it has been deemed advisable to report the detailed study in two separate publications. The remainder of the present report covers the detail of the dairy farming business and includes ninety-eight farms of the total one hundred and twenty-four farms mentioned in the introductory portion of this report. Of the ninety-eight dairy farms upon which figures were secured, it was found that sixteen were extreme in certain points and could be used in the preparation of only a few tables of this bulletin.

In the several districts, and within particular districts, farms vary in organization and size. Returns from the year's operations vary accordingly. These points are brought out in Table No. 5. As this table, however, is somewhat cumbersome owing to condensation, the main points are set forth more clearly in the following pages, which contain smaller tables (Nos. 6 to 10), made from Table No. 5, bearing on specific points.

Table No. 5.

Size. Tillable Area.	Up to 26 Acres.	26 to 45 Acres.	46 to 80 Acres.	81 to 125 Acres.	126 Acres and up.
No. of farms..............	13	19	19	19	12
Average tillable acres	19	35	64	102	190
Average actual acres........	43	84	97	130	222
Average acres in crop.......	13	25	47	76	127
Average total capital........	$9,438.35	$15,128.20	$23,832.45	$36,933.06	$67,635.81
Average capital in land	$5,225.38	$8,385.58	$13,886.58	$24,919.39	$46,116.67
Average % capital in land...	54	55	58	67	68
Average capital in buildings.	$2,243.46	$3,467.89	$4,086.58	$5,454.74	$8,512.50
Average % capital in buildings	24	23	17	15	13
Average capital in machinery	$785.25	$1,071.40	$1,893.88	$2,165.33	$4,047.06
Average % capital in machinery	8	7	8	6	6
Average capital in livestock.	$1,228.35	$2,138.12	$3,878.58	$4,260.51	$8,793.92
Average % capital in livestock	13	14	16	12	13
Average capital in feed......	$84.61	$94.91	$149.98	$169.91	$248.50
Average crop acres per man.	11	16	23	38	33
Average crop acres per horse	8	11	16	18	19
Average livestock index	105	112	101	108	116
Average crop index	89	100	95	97	113
Average dairy diversity index	57	65	64	57	63
Average % total farm receipts from crops	12	16	16	33	31
Average % expense equals of farm receipts	55	48	55	63	60
Average % farm receipts spent for labour..........	13	20	25	28	28
Average animal units	11	20	31	32	62
Average animal units per tillable acre	.60	.57	.49	.31	.33
Average receipts from crops sold	$147.12	$397.65	$532.18	$1,509.95	$3,666.05
Average feed bought	$302.89	$398.85	$644.18	$495.30	$756.24
Average depreciation, buildings and machinery.......	$161.70	$248.36	$430.62	$446.98	$769.17
Average labour hired........	$196.10	$595.05	$1,111.24	$1,974.04	$3,087.76
Average gross receipts	$1,500.20	$2,777.78	$3,895.27	$5,262.38	$11,013.66
Average gross receipts per tillable acre	$78.96	$79.37	$60.68	$51.59	$57.97
Average total current expense	$716.24	$1,310.92	$2,174.78	$3,182.36	$6,567.95
Average interest and rent....	$670.30	$983.51	$1,561.87	$2,360.56	$4,539.92
Average labour income, with interest on investment calculated at 7%..........	—$99.30	$159.05	—$337.96	—$232.82	—$490.98
calculated at 3½%........	$223.35	$634.10	$299.55	$663.23	$1,320.26
Average labour income on best farms with interest allowed at 7 %...........	3 Farms $711.13	11 Farms $492.52	6 Farms $566.53	7 Farms $843.93	6 Farms $1,124.50

LABOUR INCOMES ON DIFFERENT SIZED FARMS.

Table No. 6.

Group No.	Tillable Acres.	No. of Farms.	Average Actual Size.	Average Size in Tillable Acres.	Average Acres in Crop.	Average Labour Income Allowing Interest on Investment at 7%.	Average Labour Income Allowing Interest on In-vestment at 3½%.
1	Under 26 acres...	13	43	19	13	—$ 99.30	$ 223.35
2	26 to 45 acres...	19	84	35	25	159.05	634.10
3	46 to 80 acres...	19	97	64	47	— 337.96	299.55
4	81 to 125 acres..	19	130	102	76	— 232.82	663.23
5	126 acres and over	12	222	190	127	— 490.98	1,320.26

With interest on investment calculated at 7%, the farms of Group No. 2, with 26 to 45 acres tillable and an average of 84 total acres, were operated with greatest success. The largest farms returned the lowest labour incomes, as is shown in the column of Table No. 6, "Average labour income allowing interest at 7%." The next column, showing interest calculated at 3½%, proves that the largest farms derived greatest labour incomes, and the smallest farms secured the smallest labour incomes. The reason for the variation between these columns is the different interest rate on investment charged against the farming operations. The capitalization of the farms was so high that the average farmer could not afford to pay the higher interest; and the larger the farm the worse the labour income, with the exception of Groups No. 2 and No. 3. The farmers of Group No. 2 applied greater ability to the management of their farms, as is shown in Table No. 7.

Table No. 7.

Group No.	Tillable Acres.	Average Gross Receipts.	Gross Receipts per Tillable Acre.	Average Total Current Expense.	Average % Current Expense of Gross Receipts.	Average Labour Income Allowing 7% Interest on Investment.	Average Labour Income Allowing 3½% Interest on Investment.
1	Under 26 acres..	$ 1,500.20	$78.96	$ 716.24	55	—$99.30	$ 223.35
2	26 to 45 acres.....	2,777.78	79.37	1,310.92	48	159.05	634.10
3	46 to 80 acres.....	3,895.27	60.68	2,174.78	55	—337.96	299.55
4	81 to 125 acres.....	5,262.38	51.59	3,182.36	63	—232.82	663.23
5	126 acres and over..	11,013.66	57.97	6,567.95	60	—490.98	1,320.26

Their total receipts per acre were the largest of any of the groups, and the per cent. current expense of total farm receipts was lowest. In other words, they conducted the largest business per acre at lowest cost.

The error made by Group No. 3 was that they did not take in sufficient total receipts per acre. They had greater acreage than Group No. 2, and naturally one would expect a smaller gross receipt per acre. But they were $19.00 per acre in receipts below Group No. 2, which is an excessive drop. Again, Group No. 3 spent a greater proportion of their total farm receipts on current expenses than did Group No. 2. The economy practised by Group No. 2 increased their labour income, while lack of economy reduced the labour income of Group No. 3.

Group No. 5 took in over $57.00 gross receipts per acre, which is much above the gross receipts of Group No. 4, yet they show a smaller labour income than Group No. 4 when interest on investment is calculated at 7%. A striking disparity is noticed in the labour incomes when interest is computed at 7% and 3½%, respectively. (See last two columns of Table No. 7.) After studying these two labour income columns and considering the economy of operation as shown in column 6 of the same table, one cannot but draw the conclusion that in the farm business studied during the year the average farmer could not afford to pay interest at the higher rate. The interest charge of 7% was not excessive, as money could not be secured from banks in British Columbia on farm property at a lower rate; in fact, in many cases the rate was even higher.

Land values for this report were based on actual selling prices of land, such as prevailed in each district. For the year studied, and herein reported upon, the land values were too high to allow the average farmer to make any wages for himself where he paid interest at 7% and paid cash for his family labour, except in the case of Group No. 2, where the farmers received $159.05 as wages for the year. In this group the average size of the farm was eighty-seven acres, with thirty-five acres tillable.

The average farmers of the other groups received, and lived on the following items, which were allowed, but not necessarily paid:

    (1) Interest on investment at 7%.
    (2) Wages to the family for family labour.
    (3) Depreciation upon buildings and equipment.

On the other hand, the best farms made good labour incomes at even the higher rate of interest, as is set forth in Table No. 8.

Table No. 8.

Group No.	No. of Farms.	Average Labour Income Allowing Interest at 7%.	Average Best Labour Income Allowing Interest at 7%.	
			No. of Farms.	Labour Income.
1	13	— $ 99.30	3	$ 711.13
2	19	159.05	11	492.52
3	19	— 337.96	6	566.53
4	19	— 232.82	7	843.93
5	12	— 490.98	6	$1,124.50

Although the average farmer did not make a good labour income when interest was calculated at the higher rate, Table No. 8 brings out the fact that good labour incomes were a possibility. Returns to the operators of these farms were good. They applied thoughtful care in farm management and were rewarded by good income for the labour they expended.

A comparison of the average and best labour incomes of Table No. 8 shows that, even on farms of approximately the same size, great variation in amount of labour income occurred. The best were much above the average. This proves that factors other than size of farm influenced farm profits. The application of good farming methods on all sizes of farms was of greater importance than was the size of the farm.

The large farms had less unproductive capital tied up in buildings and machinery (see Table No. 9), and were on this account able to conduct a bigger business with less overhead charges per acre.

The fact that the interest charge was higher than could be paid by the average farmer was owing to the high capitalization per acre. It was the high percentage of capital invested in land and buildings that raised the capitalization per acre to a high point. (See Table No. 9.)

By calculating interest at 3½%, practically the same goal was arrived at in labour income as would have resulted by cutting real estate values in half. Under this lower rate of interest, or with real estate values cut in half, the average of all groups of farmers received a plus labour income.

It should be noted that under the lower rate of interest the labour incomes tend to increase with the increase in size of the farm. Group No. 3 is the only exception to this rule, but an explanation of this case has been made. (See notes on Table No. 7.)

Group No.	Tillable Acres.	Average Per Cent. Capital in Land.	Average Per Cent. Capital in Livestock.	Average Per Cent. Capital in Machinery.	Average Per Cent. Capital in Buildings.	Average Labour Income Allowing Interest at 7%.	Average Labour Income Allowing Interest at 3½%.
1	Up to 26 acres......	54	13	8	24	— $ 99.30	$ 223.35
2	26 to 45 acres......	55	14	7	23	159.05	634.10
3	46 to 80 acres.......	58	16	8	17	— 337.96	299.55
4	81 to 125 acres.....	67	12	6	15	— 232.82	663.23
5	126 acres and over..	68	13	6	13	— 490.98	1,320.26

The larger farms were able to utilize labour to better advantage. This applies not only to man labour, but horse labour as well, as shown in Table No. 10.

Table No. 10.

Group No.	Tillable Acres.	Crop Acres per Man.	Crop Acres per Horse.	Per Cent. of Total Farm Receipts That Came from Sale of Crops.	Spent for Labour.
1	Up to 26 acres.......	11	8	12	13
2	26 to 45 acres.........	16	11	16	20
3	46 to 80 acres........	23	16	16	25
4	81 to 125 acres.......	38	18	33	28
5	126 acres and up.....	33	19	31	28

As the size of the farms increased, the tendency was to increase the acreage of crop per man and per horse, as set forth in Table No. 10. This reduced the labour charge per acre and allowed a profit on a lesser receipt per acre. The amount of crops sold per farm tended to increase in proportion as the size of the farms increased. The cash realized from crops sold approximately met the labour expenses of the farm.

LABOUR INCOME AS IT IS AFFECTED BY EFFICIENCY IN THE EMPLOYMENT OF LABOUR.

Table No. 11.

Per Cent. of Total Farm Receipts Spent for Labour.	Group No.	No. of Farms.	Average Amount Spent for Labour.	Average Tillable Acres in Farm.	Average Crop Acres per Man.	Average Animal Units per Man.	Average Man Units per Farm.	Average Labour Income Allowing Interest at 7%.
Up to 10..	1	17	$ 145.84	39	25	12	1.1	$ 381.88
11 to 20..	2	19	558.07	59	24	15	1.6	— 153.44
21 to 25..	3	19	1,138.16	88	30	14	2.2	349.63
26 to 30..	4	13	1,907.94	116	26	11	3.0	— 263.01
31 to 40..	5	14	2,192.78	95	17	14	3.3	— 1,212.08
41 to 50..	6	8	2,144.19	94	22	13	3.1	— 2,190.02
51 and up.	7	8	2,132.89	73	15	9	2.7	— 2,901.03

Efficiency in the employment of labour on the farm is a great factor in increasing or decreasing the profits from farming operations. Table No. 11 shows that only two groups of farmers made plus labour incomes. These were Groups Nos. 1 and 3. Group No. 1 employed the time of 1.1 men for the year. This group represents farms where only family labour was employed in addition to that of the operator himself. The size of the farms and the type of business conducted did not warrant hiring labour continuously. The average farm of Group No. 3 had, in addition to the labour of the operator and small labour contributions from the family, the services of a man who was continuously employed. The average size of this group was eighty-eight tillable acres. The size of the farm and the type of business conducted warranted such expense for labour. In Groups Nos. 1 and 3 the farm help was kept more profitably employed at all times than in the other groups. The work was so planned that the maximum acreage was managed with least loss of time. It should be noted that in Group No. 3 the crop acreage per man is the largest, while the animal units per man are very high. Group No. 1 stood well in regard to efficiency of employment of labour, as is indicated by the crop acres and animal units per man. Group No. 2 employed 1.6 men per farm. Labour in this case was that of the operator, plus intermittent hired labour throughout the year. The acreage and type of business conducted was such that a man could not be employed all the time. During busy seasons loss occurred owing to inability to secure help at the proper time, to inefficient labour that was available, or to excessive price paid for farm help. Farmers of Groups Nos. 4, 5, 6 and 7 were extravagant in the matter of labour. The farm business was not organized so as to utilize to best advantage the labour available. As the percentage of total farm receipts spent for labour increased, so the labour income decreased.

From Table No. 11 it appears that it would be well to organize the farm operations in such a way that, with the exception of a small amount of extra labour which may be hired during rush seasons, or may be supplied by the family, help may be continuous. The amount of labour hired will depend upon the size of the farm and the type of farming business conducted. In case a farmer has a number of sons who supply him with labour, it is necessary for him so to arrange his business that a good return may be provided for each of the sons. Otherwise the labour wages allowed to the sons would rob the operator of the income he should receive for his labour.

THE EFFECT OF POOR AND GOOD LIVESTOCK AND POOR AND GOOD CROPS ON LABOUR INCOME.

Table No. 12.

		Poor Livestock.	Good Livestock.
Poor Crops.	Group No...............................	1	3
	No. of farms	27	20
	Average livestock index......................	68	142
	Average crop index	72	76
	Average labour income allowing interest at 7%..	— $915.26	— $ 33.90
	Average labour income allowing interest at 3½%	— 225.57	596.22
Good Crops.	Group No...............................	2	4
	No. of farms	14	25
	Average livestock index......................	88	131
	Average crop index	118	120
	Average labour income allowing interest at 7%..	— $613.69	$ 94.60
	Average labour income allowing interest at 3½%	518.71	875.58

Table No. 12 brings out the comparative effects of good and poor crops and livestock on labour income. Farmers of Group No. 1 had poor crops and poor livestock and secured a heavy minus labour income when interest on investment was calculated at 7%. Group No. 2 had good crops and poor livestock, but increased their labour income, as compared with Group 1 by about $300.00. Group No. 3 had poor crops, but good livestock, and increased their labour income over Group No. 1 by nearly $900.00. These comparisons show that, during the year these farming operations were studied, it was important to have good yields of crops, but that it was even more important to have good livestock. Most of the crops were used as feed for livestock on the farm, and the ability of

the livestock to make economical use of the feed was a great factor towards increasing the labour income.

The farmers of Group No. 4 had both good crops and good livestock and show an increase of about $1,000.00 over the farmers of Group No. 1, who had poor crops and poor livestock. When labour incomes are calculated with interest on capital at 3½%, they appear much more attractive than when interest is allowed at 7%. The conclusions one would gather from a study of Table No. 12 would be that good livestock and good crops contribute a great deal towards successful dairy farming. Of the two factors, good livestock appears to have had the greater effect.

THE EFFECT OF THE PURE-BRED SIRE ON THE PRODUCTION OF THE HERD.

Table No. 13.

Kind of Sire and Number of Years Used on Farm.	No. of Farms.	Average Total Digestible Nutrients per Cow.	Average Production Efficiency of Cows.	Average No. of lbs. Butter-fat Sold per Cow.	Average Receipts per Cow in Milk Products.
Grade sire	24	4,074	20.8	208	$146.69
Pure-bred sire, 2 to 6 years.........	23	3,948	19.9	211	149.02
Pure-bred sire, 7 to 10 years........	17	3,867	17.9	222	156.43
Pure-bred sire, 10 years and over ...	13	4,325	18.3	238	166.43

Table No. 13 points out the effect of the pure-bred sire as a means of increasing the amount of butter-fat per cow. The longer the pure-bred sire had been used on the farm, the greater was the average amount of butter-fat sold per cow. In addition to the increased production, Table No. 13 shows that, with the exception of the last group of the table, the efficiency of the cows increased with the length of time the pure-bred sire had been used. In other words, less feed was used to produce a pound of butter-fat. The feeding in the case of the last group was not as economical as in the case of the other groups. The amount of butter-fat sold per cow, however, was the greatest of any of the groups. The uneconomical use of feed in the last group may be justified by the higher production of the cows, and by the consideration that the farmers may sell their young stock at higher prices than farmers of the other groups on account of the higher production of their herds.

THE COMPARATIVE EFFECT OF BREEDING VERSUS FEEDING, AS SHOWN BY LABOUR INCOME.

Table No. 14 compares different methods of feeding poor and good livestock, expressing the results in terms of labour income. It should be noted that there are no farms in Groups 3 and 4. The farmers with good livestock fed more heavily than did the farmers who had poor livestock. No doubt this accounts in some measure for the higher grading of the livestock on the farms which had the better class of farm animals.

By a comparison of the labour incomes when 7% interest was allowed on investment, Table No. 13 shows that Group No. 5 was the only group that received a plus labour income. Group No. 2 increased its labour income by about $500.00, as compared with Group No. 1, by heavier feeding. Groups 1 and 2 both had poor livestock. This fact shows that good feeding was a factor which increased labour incomes on farms which kept poor livestock. Group No. 5 increased its labour income over Group No. 2 by about $500.00. This gain is not due to amount of feed used, since a smaller amount of feed was consumed by each animal on the farm than was the case in Group No. 2. The gain was due to the fact that a superior class of livestock was kept. The superior livestock resulted from better breeding, as is shown by the fact that 47% of the farmers of this group had kept a pure-bred sire five years and over as compared with 31% in Group No. 2.

		Medium Feeding.	Good Feeding.	High Feeding.
Poor Livestock.	Group No.	1	2	3
	No. of farms	19	16	0
	Per cent. of farms with pure-bred sire 5 years and over	36	31	..
	Average total digestible nutrients per animal unit	2,695	3,682	..
	Average production efficiency of cows	20	23	..
	Average labour income allowing interest at 7%	— $823.87	— $337.23	..
	Average labour income allowing interest at 3½%	— 135.20	506.68	..
Good Livestock.	Group No.	4	5	6
	No. of farms	0	17	22
	Per cent. of farms with pure-bred sire 5 years and over	..	47	50
	Average total digestible nutrients per animal unit	..	3,404	5,154
	Average production efficiency of cows	..	17	24
	Average labour income allowing interest at 7%	..	$167.40	— $ 20.49
	Average labour income allowing interest at 3½%	..	895.20	715.75

Although the farmers of Group No. 6, who practised high feeding methods on good livestock, made greater labour incomes than either of the groups with poor livestock, they did not do as well as Group No. 5. Group No. 6 fed too heavily for most profitable returns, as their labour income was less than that of Group No. 5, where good feeding methods were practised.

Table No. 14 shows, then, that farmers would do well to feed rather liberally. Underfeeding proved a greater mistake than overfeeding. A happy medium should be secured. By feeding according to the production of the herd, the farmers secured most profitable returns. Though feeding is a great factor in labour income, the breeding of the herd is of greater importance, as is shown in Table No. 14.

RENTED VERSUS OWNED FARMS.

Table No. 15.

	Owned Farms.	Cash Rented Farms.
No. of farms	66	14
Average number of acres per farm	72	90
Average operator's capital per farm	$29,378.00	$5,209.52
Average farm receipts per farm	4,589.80	4,908.02
Average farm receipts per acre	63.74	54.53
Average interest on capital at 7%, and lessee's rent	1,935.29	1,266.43
Average rate of interest on investment rent equals	..	4.5
Average labour incomes at 7% interest	— $480.57	$230.37
Average owner's labour income at 4.5% interest	200.83	..

Table No. 15 compares owned and rented farms. The great proportion of farms investigated were owned by the operators; the table includes sixty-six owned farms and fourteen rented ones. The average size was ninety acres in case of the rented farms, and seventy-two acres in case of the owned farms.

Naturally, the operators' capital was greater where the operators owned their farms. The operators of rented farms had no capital in land and buildings. As the renters had greater acreage, they secured greater total farm receipts; but total receipts per acre were greater in case of the owned farms.

The owner's interest on investment at 7% was greater than the average rent the lessees paid to their landlords by about $700.00. The amount paid in rents equalled 4.5% of the value of the farms that were leased. In comparing the labour incomes of the two groups, when interest on operator's capital was allowed at 7%, the lessees had the advantage by about $700.00. The difference is counterbalanced by the increased interest rate allowed on owned farms as compared with the total rent that lessees paid. When interest on owned farms was calculated at the same rate that the lessees paid in rent, the labour income on the owned farms is just over $200.00—practically the same as was secured on rented farms.

It would seem from Table No. 15 that, if one were to start farming, the question of renting or buying would be one depending upon the amount of capital on hand. If one had capital of his own, or could secure money at 4.5%, he would be well advised to buy. If a higher rate of interest were demanded for cash with which to make the purchase, the prospective farmer might do well to rent for a few years rather than to buy immediately.

WHAT INTEREST ON INVESTMENT DID OWNED FARMS RETURN?

When wages were allowed to operators at the rate of $80.00 per month, and $50.00 per month to such partners as were engaged along with the operators in the farming operations, this investigation shows that, during the crop year of 1920, the farms paid interest on capital invested at the rate of 1.9%. Had operators and joint operators been allowed wages at $500.00 per year for their labour, along with free house and farm products used in the house, the rate of interest on capital invested would have been 3.8%. This is the rate that owned farms returned in 1919. In other words, the farming operations were not quite so successful for the crop year of 1920 as they were for the crop year of 1919.

THE EFFECT OF SPECIALIZATION IN DAIRYING ON FARMS OF VARIOUS SIZES.

Table No. 16.

Size.	Dairy Diversity Index.	Group No.	No. of Farms.	Average Tillable Acres.	Average Dairy Diversity Index.	Average Labour Income Allowing 7% Interest on Capital.	Average Labour Income Allowing 3½% Interest on Capital.	The Best Farm of Each Group.	
								Labour Income Allowing 7% Interest on Capital.	Dairy Diversity Index.
Up to 35 acres.	Below 65	1	12	23	41	— $187.85	$157.97	$1,997.10	60
	65 and over	2	11	23	80	— $294.48	$57.03	$506.08	87
36 to 60 acres.	Below 65	3	13	44	44	— $139.39	$343.97	$1,428.30	63
	65 and over	4	14	47	80	— $407.93	$290.58	$816.51	83
61 to 100 acres.	Below 65	5	11	82	40	— $472.82	$276.76	$1,879.44	5
	65 and over	6	12	78	79	— $679.15	$223.41	$816.80	86
100 acres and up.	Below 65	7	13	174	37	— $959.11	$854.99	$2,752.35	47
	65 and over	8	12	149	84	— $1,013.78	$466.51	$2,700.06	65

A large number of farms included in the investigation specialized in dairying to a high degree. To show the general effect of the practice, Table No. 16 was prepared. Farms were divided into four groups, according to size. Each of these groups was divided into sub-groups, according to the percentage of total farm receipts which came from the dairy. As approximately half the farms of each main group received less than 65% of their total farm receipts from the dairy, 65 was taken to represent the dividing line, and each main group was divided into sub-groups accordingly.

With interest calculated at both 7% and 3½%, Table No. 16 shows that, of each main group, the sub-group of farmers who realize less than 65% of their total farm receipts from the dairy receive better labour incomes than those whose total farm receipts from that source are above 65%. The dairy diversity index column of the best farm of Table No. 16 shows that, in each group, practically all the farms featured the dairy to a high degree. The best farm of Group No. 5 received only 5% of total farm receipts from the dairy—a very low percentage. The operator's receipts in this case came largely from the sale of crops. Other farms of the same group, though they received a slightly lower labour income, made up to 50% of their farm receipts from the dairy. The average labour incomes of Table No. 16 indicate that it might be well not to feature the dairy as strongly as some farmers did. The best labour income column of Table No. 16, considered in connection with the dairy diversity of these best farms (columns 9 and 10), makes one hesitate to suggest curtailment of the dairy; the inference to be derived is rather that more side lines should be carried in addition to the dairy farming business as conducted at present. This would mean that the total receipts from the farm would be increased, while the proportion of the receipts from the dairy would be reduced. The side lines may be hogs, sheep, poultry, horses, or such grain or seed crops as may fit well into the dairy business—the chief concern of these farms.

With interest on investment calculated at 7%, the average labour incomes of all groups of Table No. 16 show a minus. With interest figured at 3½%, all labour incomes are shown as plus. The greater interest charge against the business was more than the average farmer could pay. Yet in each group the best labour income indicates that, by careful and thoughtful planning on the part of some farmers, satisfactory returns were possible, even at the higher rate of interest. These farmers built up their total farm receipts to a high point and practised economy in the matter of farm expenses.

The best labour income of Group No. 1, of Table No. 16, was $1,997.10. The acreage in this group is small as compared with that of the other groups, yet the best labour income was greater than any other best labour income except those of the largest farms. This was owing in a large measure to the size of the business developed. It would appear, then, that in the dairy business it is not the size of the farm that influences farm profits so much as the size of business per farm. With the high capitalization per acre of the farms studied, it seems essential that a large-sized business be developed to meet the heavy overhead expenses in interest. Table No. 16 shows that, with the exception of Group No. 3, the larger the farm the greater was the minus labour when interest was calculated at 7%.

With interest calculated at 3½%, the smallest farms returned the smallest labour incomes, and the largest farms the greatest labour incomes. This is as it should be, as the larger farms handled the greatest amount of business. The labour incomes of Groups 3 and 4, however, are greater than those of Groups 5 and 6, and this fact indicates that possibly the 61 to 100-acre farms were too difficult to handle with profit as compared with the 36 to 60-acre farms. The farms from 36 to 60 tillable acres offered practically as great opportunity to the dairy farmers as did any other size of farm when interest was calculated at 3½%, and the greatest opportunity with interest calculated at the higher rate.

The Specialized Dairy Farming Business

The farms included in this group were those where at least 50% of the gross farm receipts came from the sale of products from the dairy herd.

THE EFFECT OF SELLING CASH CROPS ON LABOUR INCOME.

Table No. 17.

	Average Percentage of Total Farm Receipts that come from Sale of Farm Crops.		
	(1) Up to 1%	(2) 1% to 10%	(3) 11% and over.
No. of farms	20	19	10
Average size in tillable acres..........	58	59	106
Average dairy diversity index	80	79	65
Average animal units per acre	0.6	0.5	0.3
Average value of crops sold...........	$7.66	$159.29	$1,460.48
Average labour income allowing interest on capital at 7%..................	— $438.40	— $279.47	$467.26
Average labour income allowing interest on capital at 3½%...............	$237.53	$394.12	$1,369.80

Table No. 17 was prepared to show the effect of selling cash crops on the labour income of specialized dairy farms. With interest on investment calculated at both 7% and 3½%, the labour income increased with the higher percentage of receipts that came from the sale of crops. It should also be noted that the number of animal units per acre decreased with the increased sale of farm crops. The size of the farms, in case of the group which sold most crop, was larger than that in the other groups, and yet the labour income was better. Previous tables show that, on the average, the large farms returned lower labour incomes when 7% interest was charged on investment. The operators of large farms, however, who sold a relatively high percentage of crops overcame this disadvantage. With interest calculated at 3½%, these farmers received a much better labour income than the operators of the smaller groups.

LABOUR INCOME AS IT IS AFFECTED BY THE PERCENTAGE OF TILLABLE AREA OF THE FARM USED AS PASTURE.

Table No. 18.

Percentage of Tillable Area of Farm in Pasture.	No. of Farms.	Tillable Acres.	Average per Cent. Total Acres in Pasture.	Labour Income Allowing 7% Interest on Investment.	Labour Income Allowing 3½% Interest on Investment.
Up to 30% in pasture..........	21	59	20	— $214.34	$317.51
31% to 40% in pasture.........	15	78	35	$15.22	$797.88
41% and over in pasture........	18	83	48	— $678.09	$456.07

Table No. 18 brings out the effect of varying percentages of total farm area kept in pasture on the returns from the farm during the year covered by this investigation.

This table shows that the farmers who had an average of 35% of their total tillable area in pasture made the greatest average labour income. (The meaning of the term "tillable area" should not be mistaken; see "Explanation of Terms" of this bulletin.) The farmers who had a greater or lower percentage in pasture did not do so well. The greater error appears to be that of a percentage in pasture greater than 35 rather than smaller. As different soils and locations are more suitable for pasture than others, every farmer cannot apply this definite rule to his farm. Yet many farmers would be well advised to give this question of proportion of tillable area in pasture their serious consideration, and to make provision for good summer feed, either in good pasture or by means of silage. This would enable many to cut down on acreage devoted to pasture. Though an excellent feed, pasture does not in many cases give the feed necessary per acre for most economical dairying on the high-priced farming land of British Columbia.

THE COST OF PRODUCING BUTTER-FAT.

For the purpose of determining the cost of producing butter-fat, only those farms could be used where at least 50% of the total farm receipts came from the dairy cattle through the sale of milk, milk products and dairy stock. In other words, the farms which could be used in calculation were those where the operators had specialized in the dairy business. On such farms the side lines would have the effect of decreasing or increasing the cost of production of butter-fat according as the production of the side lines themselves was profitable or otherwise. The returns from these side lines, then, may be correctly credited to the cows, seeing that the farms were in effect rented to the dairy, and all effort was directed towards the economical production of butter-fat, the side lines contributing their part to this end. The method of arriving at the cost of producing butter-fat may be illustrated by the following example:

Farm, No. 32A.
Size, 45 acres.
No. of cows, 20.5.
Lbs. of butter-fat sold, 5,289.5.
Total farm capital, $24,053.85.

FARM EXPENSE.

Labour hired	$1,472.55
Feed bought	509.35
Seed bought	43.95
Repairs to machinery	80.05
Taxes	181.60
Other farm expense	305.25
Depreciation on buildings and machinery	479.41
Livestock purchased	350.00
Decrease in livestock values	53.50
Breeding fees	7.00
Interest on total farm capital at 7%	1,683.77
Operator's labour	960.00
Total farm expense	$6,126.43
Revenue from side-lines	2,244.25
Cost of producing butter-fat	$3,882.18

REVENUE FROM SOURCES OTHER THAN MILK.

Crops sold	$ 478.00
Eggs sold	12.09
Livestock sold	1,005.96
Increase in feed and supplies	686.70
Miscellaneous receipts	61.50
Total receipts from side-lines	$2,244.25

5289 lbs. butter-fat cost...$3,882.18
1 lb. butter-fat cost...73 1/3 cts.

In the example shown, it should be noted that wages at the rate of $80.00 per month were allowed to the operator. As previously stated, he had also the use of a house, and, with the exception of meat, secured farm products for the house without charge.

Of all the farms considered in the investigation, sixty-three were used for the purpose of determining the cost of production of butter-fat. On these sixty-three farms the average cost of producing a pound of butter-fat for the year, as determined by the method shown, was $1.06. The extreme range in the cost of producing a pound of butter-fat between the farms producing at highest and

those at lowest cost was from 37 cents to $2.52. It will be seen that an average cost determined from such a wide range must be considered as an approximation.

The average cost the previous year was 93 cents per pound butter-fat. The increase may be accounted for by the heavy drop in livestock values. Had the value of livestock values, as shown in the inventory, not decreased during the year, the cost would have been 96 cents per pound butter-fat. Again, had the livestock sold during the year brought as good prices as prevailed during the previous year, the cost would have been 93 cents, or the same as the previous year. It has been stated that the feed was cheaper during 1920-1 than during the previous year, and one might think that it would cost less to produce butter-fat on that account. It must be remembered, however, that dairymen on these farms not only bought, but also sold feed, so that the drop in feed prices did not affect the cost of production of the butter-fat. Labour was slightly lower, but taxes were higher, and other expenses about the same.

As the average selling price of the butter-fat was 70 cents per pound, one can see that many farmers must have produced butter-fat at a loss. A large percentage of the farmers own their own farms, and for that reason do not have to meet the expense of interest with cash. This explains how farmers can stay in the dairy business and yet show an apparent loss. However, it is not a business-like way to conduct the farming operations. Most other manufacturing plants must allow for an interest payment, since interest has to be paid.

It was found that the average cost of producing a pound of butter-fat when interest was left out altogether was 67 cents. Since the average selling price was 70 cents per pound, this leaves an average spread of 3 cents per pound butter-fat with which to meet interest on the investment. Such a margin is equivalent to one-half of one per cent. of the investment in these farms for the year. This percentage is arrived at by multiplying the total number of pounds of butter-fat sold by three, and expressing the product as a percentage of the total capital invested in the dairy business of the 63 farms.

THE EFFECT OF THE SIZE OF THE HERD AND THE AMOUNT OF BUTTER-FAT SOLD PER COW ON THE COST OF PRODUCING BUTTER-FAT.

Table No. 19.

Groups of Farms According to Cost of Production.	No. of Farms.	Average No. of Cows per Farm.	Average Pounds Butter-fat Sold per Cow.	Average Cost of Producing 1 lb. Butter-fat for Sale Allowing 7% Interest on Investment.	Average Cost of Producing 1 lb. Butter-fat for Sale Allowing No Interest on Investment.
Up to $1.00	22	24	241.5	$0.79	$0.48
$1.01 to $1.25	20	17	227.8	1.14	0.77
$1.26 and up	21	13	199.7	1.58	0.96

It will be noted that the farmers producing at lowest cost used, on the average, larger herds of cows. The smallest herds were in the group with highest costs. Because of the relatively reduced overhead charges per cow in the case of the larger herds, the cost of production of butter-fat tended to be lower. It does not necessarily follow, however, that the largest herd was operated at greatest profit. Most profitable operation of farms depends upon a due balance being maintained between the dairy herd and other factors.

The production per cow is a factor of no small importance in considering the means of reducing the cost of production. The dairyman must realize this fact, and have enough courage to override sentiment and get rid of cows that are not producing up to this standard. Just what the standard production should be cannot be determined at present; but, so far as appears from investigation up to the present, the average herd should produce at least 250 lbs. of saleable butter-fat per cow per year, and as much above this as possible. Many herds are now above this standard, but a large number of them fall below.

The last column of Table No. 19 shows the cost of producing a pound of butter-fat in the three different groups, not allowing for any interest on capital investment in the farm. When we consider that the farmer sold the butter-fat

for 70 cents a pound, there appears to be a loss to the farmers of the last two groups. They certainly did not make their farms so profitable as to return them a wage as high as $80.00 per month, the wage allowed in the calculation. They were forced to take a wage below $80.00 per month, in proportion to the degree of loss sustained per pound of butter-fat and the number of pounds of butter-fat sold.

THE EFFECT OF THE PURE-BRED SIRE AND OF EFFICIENT FEEDING ON THE COST OF PRODUCING BUTTER-FAT.

Table No. 20.

Groups of Farms According to Cost of Producing Butter-fat.	Percentage of Farms with Pure-bred Sire Five Years and Over.	Average Production Efficiency of Cows.	Average Cost of Producing 1 lb. of Butter-fat for Sale Allowing 7% Interest on Investment.
Up to $1.00....................	66	16.6	$0.79
$1.01 to $1.25....................	55	18.0	1.14
$1.26 and up....................	33	19.1	1.58

The pure-bred sire took a prominent part in the reduction of the cost of producing butter-fat, as is set forth in Table No. 20; two-thirds of the farmers in the group which produced at lowest cost had used a pure-bred sire five years and over. The farmers who produced at greater cost were not so careful in regard to the breeding of the herd. So important is the factor of breeding that dairymen cannot afford to take a chance on using sires that are no better than the cows of the herd. It does not necessarily follow, however, just because the pure-bred sire has been used, that low production costs will result, since the two latter groups of farms had a number of pure-bred sires in use, and still produced at a loss. It is not enough that the sire be pure-bred. He must come of stock that is of high production on both his sire's and dam's side. One cannot expect any sire to transmit high production to his herd unless he himself belongs to a family of high producers. Table No. 20 brings out the fact that those farmers who produced at lowest cost achieved greatest efficiency in their feeding operations. The first group used 16.6 total digestible nutrients to produce a pound of butter-fat, while the other farmers did not feed so economically. The number of total digestible nutrients fed per pound of butter-fat sold increased, as did the cost of production. The improved breeding of the cows, which resulted from the use of pure-bred sires, made it possible for the farmer to get greater efficiency from the feed supplied to the cows.

THE EFFECT OF THE AMOUNT OF FARM BUSINESS ON COST OF PRODUCING BUTTER-FAT.

Table No. 21.

Groups of Farms According to Cost of Producing Butter-fat.	Average Tillable Acres.	Average Total Receipts of Farm.	Average Total Receipts per Tillable Acre.
Up to $1.00......................	89	$5,861.70	$65.86
$1.01 to $1.25......................	69	4,132.25	68.58
$1.26 and up......................	58	2,982.52	51.42

In order to produce any article economically, one must develop a business of considerable proportions. Furthermore, if the machinery does not operate up to capacity, there results a certain loss due to overhead charges. In Table No. 21 it will be seen that the group having the greatest number of tillable acres per farm produced most economically. The other two groups had smaller returns, as one would expect, from their smaller acreage. In the matter of receipts per

acre it will be noted that, while the second group took in only $3.00 more per acre than the first, the farms are smaller by twenty acres. This relative increase was not large enough to make up for the large decrease in the relative size of the farm as compared with the first group. The last group had not only a smaller receipt per acre than both the first and second groups, but the acreage is again below that of the second group by eleven acres. Ordinarily the largest farms should take in the greatest total receipts, but the smaller farms should necessarily take in a greater receipt per acre. Failure of this principle has raised the cost of production of butter-fat per acre in the case of the latter two groups of farmers, as is shown in Table No. 21. It has been previously pointed out in this report that the farmers who operated the large farms worked at a disadvantage when interest at 7% was allowed on investment. According to Table No. 21, the operators of large farms have the advantage in so far as the farmers who operated largest average acreage produced butter-fat at lowest cost. This is due to the fact that they built up the receipts per acre to a relatively higher level, considering their larger size, than did the other two groups.

HOW THE COST OF PRODUCING BUTTER-FAT IS INFLUENCED BY GOOD CROPS AND THE ECONOMICAL EMPLOYMENT OF LABOUR.

Table No. 22.

Groups of Farms According to Cost of Producing Butter-fat.	Crop Index.	Average Dairy Diversity Index.	Average per Cent. of Farm Receipts Spent for Labour.	Average per Cent. from Receipts Crops.
Up to $1.00	102	78	22	9
$1.01 to $1.25	99	77	24	6
$1.26 and up	92	81	30	9

As was previously shown, good crops are a factor that improves labour incomes. In Table No. 22 it is shown that good crops help to reduce the cost of butter-fat production. As the yield of crop decreases, so the cost of production of butter-fat increases. As far as specialization in dairying is concerned, the three groups received practically the same proportion of their total farm revenue through the medium of the dairy cattle. (See dairy diversity index, col. 3.)

The group of farmers producing butter-fat at lowest cost utilized labour to best advantage. They received the greatest returns for labour hired, as is shown in Table No. 22, col. 4. Only 22% of their total farm receipts was spent for labour. The latter two groups did not realize as well as they should have done on the amount spent for labour.

THE EFFECT OF FEEDING VERSUS BREEDING AS A MEANS OF REDUCING THE COST OF BUTTER-FAT PRODUCTION.

It is realized that good feeding and good breeding have a definite effect on butter-fat yield per cow. To determine which of these factors had the greater effect in reducing the cost of butter-fat production, Table No. 23 was prepared.

On the farms having poor livestock it was found that the tendency was to feed less than on farms where good livestock was kept. It will be noticed that in Table No. 23 there are no farmers in the poor livestock group who practised high feeding, and in the good livestock group no farmers who practised medium feeding. The farmers of the good livestock group had herds of better breeding, since a greater percentage of them used pure-bred sires five years and over. In the poor livestock group 33 and 36 per cent. respectively of the farmers kept a pure-bred sire five years, while in the good livestock group 50 and 61 per cent. respectively of the farmers kept a pure-bred sire over the five-year period. The amount of butter-fat increased with heavier feeding in both the poor and good livestock groups. Heavier feeding increased the average production in the poor livestock group by 13 pounds, and in the good livestock group by 17 pounds. The difference between the production of the poor livestock group and the good livestock group is much more marked than is the difference

in each group as the result of better feeding. Whereas the good feeding of the good livestock group was 143 units lower than in the case of the poor livestock, the butter-fat sold per cow was 47 pounds greater. This brings out clearly the fact that breeding did more to increase the butter-fat than did feeding. Although butter-fat production is increased by heavier feeding, one must use great discretion as to the amount by which feed should be increased.

Table No. 23.

	Groups.	Medium Feeding.	Good Feeding.	High Feeding.
Poor Livestock.	No. of farms.....................	12	11	
	Average total digestible nutrients per animal unit	2,703	3,749	
	Average pounds butter-fat sold per cow	178	191	
	Average production efficiency of cows	15	19	
	Percentage of farmers who used a pure-bred sire five years and over	33	36	
	Average cost of producing butter-fat, allowing interest at 7%.........	$1.30	$1.41	
	Average cost of producing butter-fat, allowing no interest............	$0.82	$0.92	
Good Livestock.	No. of farms.....................		22	18
	Average total digestible nutrients per animal unit		3,606	5,110
	Average pounds butter-fat sold per cow		238	255
	Average production efficiency of cows		15	20
	Percentage of farmers who used a pure-bred sire five years and over		50	61
	Average cost of producing butter-fat, allowing interest at 7%.........		$1.07	$1.13
	Average cost of producing butter-fat, allowing no interest............		$0.64	$0.75

It is noted that in both the poor and good livestock groups the production efficiency decreased with higher feeding methods. Or, in other words, the number of total digestible nutrients required to produce one pound of butter-fat increased. Referring to Table No. 23, one sees that medium feeders of the poor livestock group and the good feeders of good livestock used fifteen total digestible nutrients to produce one pound of butter-fat. The farmers who practised higher feeding did not get as satisfactory results in either the poor or good livestock groups, seeing that it took, respectively, nineteen and twenty total digestible nutrients to produce one pound of butter-fat. The conclusion is, then, that the good feeders of poor livestock and the high feeders of good livestock overfed their cows.

Though the farmers with good livestock fed more heavily than those with poor livestock, Table No. 23 shows that they produced their butter-fat more cheaply than either of the poor livestock groups.

The farmers who produced butter-fat at lowest cost were those who kept well-bred stock and practised good feeding methods.

Table No. 23 shows that higher feeding increased the amount of butter-fat sold per cow, but that increased feeding must be done with consideration of the production per cow. Good cows will consume more feed, as is shown in Table No. 23, but returns justify the increase of feed, since production costs are lower than in the case of the poor livestock groups. Though the farmers who practised high feeding methods with good livestock did not secure as satisfactory results in feeding as did the good feeders of poor livestock, their production costs were lower. The loss through heavier feeding no doubt was more than made up by sale of young stock. Such sale was made possible from the fact that the higher production of the cows allowed the farmers to sell their young stock to good

advantage, and thus reduce their production costs below that of the farmers who kept poor livestock and practised good feeding. Table No. 23 shows, then, that feeding increased production per cow, but that good breeding of the herd had a much greater effect on reducing the cost of producing butter-fat than had feeding.

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Summary

As previously stated, the conclusions of one year's farm operations cannot be considered final.

The following conclusions are tentatively offered with respect to the dairy farms investigated for the purposes of this bulletin:

1.   Dairy farms with from twenty-six to forty-five tillable acres offered practically as great opportunity for the dairyman as the larger farms.   (Tables Nos. 7, 8 and 16.)

2.   The size of the business was a more potent factor than the size of the farm as a means of increasing returns on farms.   (See notes re Table No. 16.)

3.   When interest on the total capital was allowed at the rate of 7% the average returns on the farms were not sufficient to allow wages to the operators of the farms, with the exception of Group 2, Table 7.   (Tables Nos. 7 and 16.)

4.   The employment and management of farm help were factors which very materially affected labour incomes.   (Table No. 11.)

5.   Good crop yields were essential to good returns.   (Table No. 12.)

6.   High quality livestock had a greater effect towards increasing labour incomes than did good crop yields.   (Table No. 12.)

7.   Farms on which pure-bred sires were used sold more butter-fat per cow than did other farms.   (Table No. 13.)

8.   Breeding was a greater factor than feeding as a means of increasing labour incomes.   (Table No. 14.)

9.   The average rental of leased farms equalled 4.5% of the total value of the farms.   (Table No. 15.)

10.   The operators of owned farms received 1.9% interest on investment, along with wages, a free house, and farm products used in the house.   (Page 12.)

11.   It paid the dairy farmers to produce and market cash crops.   (Tables Nos. 16 and 17.)

12.   Some dairymen used too small, and some too great, a percentage of their farms as pasture.   (Table No. 18.)

13.   The cost of producing butter-fat, computed as shown on Page 15, varied on different farms from 37 cents to $2.52 per pound.   The average cost was $1.06 per pound.   (Page 15.)

14.   Farmers who produced butter-fat at lowest cost had larger herds, sold more butter-fat per cow, had better bred stock, fed more economically, handled a larger farm business, grew better crops and used labour more efficiently than did the farmers whose costs of production were high.   (Tables Nos. 19, 20, 21 and 22.)

15.   The breeding of the herd was a more potent factor in reducing the cost of producing butter-fat than was the feeding of the herd.   (Table No. 23.)