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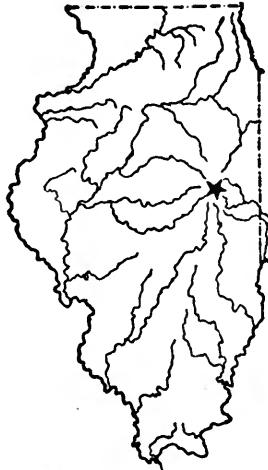


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MILK SUPPLY OF CHICAGO AND TWENTY-SIX
OTHER CITIES

BY JOHN M. TRUEMAN



URBANA, ILLINOIS, NOVEMBER, 1907

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MILK SUPPLY OF CHICAGO AND TWENTY-SIX OTHER CITIES

BY JOHN M. TRUEMAN, FIRST ASSISTANT, DAIRY HUSBANDRY

This bulletin reports a study of the milk supply of Chicago and twenty-six other cities of 10,000 or more population in Illinois. Practically all of the 1,100 samples of milk here reported were collected and analyzed by the writer, who spent his entire time for seven months (May to November, 1905) investigating the conditions under which milk is sold in Chicago. He covered the same territory again in 1906, and personally inspected the conditions affecting the milk supply in the other cities referred to.

There is no doubt that the best dealers in Chicago are furnishing a finer grade of milk at a lower price than can be found in almost any other large city in Illinois. It has been demonstrated that it is possible to bottle milk in the country and put it on the Chicago market in fine condition for seven cents per quart.* Some whole districts in that city get universally good milk, while in others, supplied chiefly by the small milk depot, the bulk of the product is poor. In one district occupied by working people just one-half of the 150 samples collected were below grade in butter fat. Most of this milk is up to grade in butter fat when it comes to the city, and until after the small dealer has skimmed a quart or two of cream from it.

Many filthy and unsanitary dairies and city milk plants were found, but the greatest danger to the health of milk consumers was observed in the bottling methods employed by the Chicago dealer who runs a half dozen milk wagons. Incidents of this inspection are told in the following pages, together with the conditions of dairy, bottling plant, milk depot, and wagon necessary to produce and deliver to the consumer clean, wholesome milk. A definite and practical method of inspection by means of the score card is also added.

FIVE METHODS OF MARKETING MILK

Five distinct methods are used in this country for supplying cities with milk.

1. In the smaller cities, a large part of the milk is delivered to the consumer by the dairyman who produces it. In many cases

*True at least at the time these data were taken.

the milk is bottled at the farm. This direct method would be the best if the dairyman used sanitary methods in all his work. But the writer found a larger percent of sediment (filth) in milk so handled than in milk marketed by any other method. In many instances the bottles used were not sterilized at all. The people who keep one or two cows in the city and sell milk to their neighbors often use worse methods than the regular dairyman.

2. The milk is shipped from the farm in cans to the city and bought by either retail or wholesale dealers. The very small retailers get their milk from the large dealers. Most of this milk is sold directly from the can without bottling. This method gives the dealer very little opportunity to know anything of the conditions under which the milk is produced.

3. The milk is taken by the farmers to nearby creameries or milk stations where it is more or less carefully inspected and shipped to the city in cans holding from two to ten gallons. In the city the milk is bottled, and in some cases it is also pasteurized, either before or after reaching the city.

4. The milk is shipped from the farm in cans to large dealers who have bottling plants in the city. Milk that comes thus from inspected farms, that is quickly cooled after reaching the city, and is put in sterilized bottles by sanitary methods, is a fair article. But here again, the dealer is too far from the dairyman to keep in touch with his methods. Too often he finds that the milk will not keep sweet and so resorts to pasteurization as quickly as possible. And too much of this milk comes from dairies that are not clean and is handled in the city by bad methods. Such milk put into unsterilized bottles is probably the most dangerous of any sold in Chicago. The worst milk as well as the best milk is delivered in bottles.

5. The milk is delivered by the farmer to a bottling plant in the country, where it is quickly cooled, bottled, packed in ice and shipped to the city. By this method the milk is put under the control of the dealer in the shortest time possible after milking, and does not travel or wait several hours before proper cooling. The best milk in Chicago is furnished in this way. Furthermore, the men in charge of the bottling plant are in close touch with the producer and can aid him in establishing the best methods of caring for his milk. This is the ideal way of handling the product for city consumption.

All five methods are extensively used in Chicago, but St. Louis gets a large part of its milk by the third method.

CHICAGO CONDITIONS

UNSANITARY MILK DEPOTS

It was an exception to find a milk depot* that was clean and sanitary. A great many of these markets are located in dark, dirty, and ill-ventilated basements where the sunlight never enters. They are never scrubbed out and many of them could not be scrubbed clean because the floors are of rotten wood or only of earth; and so they are kept foul with sour and decaying milk. These depots would be bad enough if they received only bottled milk and sold it without opening the bottle; but commonly the milk is stored in large cans dipped into open vessels when sold and often carried through dusty streets for several blocks. Such conditions are deplorable. Occasionally, but rarely, one of these small depots is found scrupulously clean.

BETTER MILK FROM THE WAGONS OF THE LARGE DEALERS

In the better portions of the city much of the milk is delivered from wagons, and a large part of it by big dealers. This milk is uniformly up to grade in butter fat but the amount of sediment in the bottom of the bottle is occasionally quite large. If all parts of the city were furnished with as good milk as the wealthy people receive, very little cause for criticism would exist. It is not primarily a question of price, as the greater part of the best milk sold in the city retails from seven to eight cents, while the poor milk sold to the working people from open cans brings six cents. It is cause for congratulation that an increasing proportion of the working people are being supplied with clean milk in sterilized bottles. The small depot, although it keeps the milk cold for the poor people who have no ice box or cellar and enables them to buy in small quantities, is a doubtful blessing. The best of the big dealers furnish a much better quality of milk at a moderate price, and it may be kept sweet in a cool cellar for the day's consumption.

The following tables exhibit the conditions of some hundreds of samples of milk taken by the writer under a variety of conditions in the city of Chicago in the summers of 1905 and 1906:

*A milk depot is a place where milk is retailed.

TABLE 1. THE PERCENTAGE OF BUTTER FAT IN SAMPLES OF MILK COLLECTED IN CHICAGO DURING THE SUMMER OF 1905

Sample number.	Fat, percent.	Sample number.	Fat, percent.	Sample number.	Fat, percent.	Sample number.	Fat, percent.	Sample number.	Fat, percent.
1	3.0	51	3.6	101	3.8	151	2.0	201	---
2	3.0	52	3.0	102	3.4	152	3.5	202	---
3	3.3	53	3.1	103	4.0	153	2.8	203	3.6
4	3.2	54	4.2	104	3.9	154	1.6	204	3.2
5	2.2	55	3.6	105	3.4	155	2.2	205	3.7
6	3.9	56	3.4	106	3.0	156	3.3	206	3.6
7	3.0	57	3.6	107	3.5	157	2.4	207	4.0
8	0.9	58	3.4	108	3.6	158	2.7	208	3.6
9	3.2	59	3.5	109	3.4	159	3.9	209	---
10	2.0	60	3.6	110	2.8	160	3.0	210	2.6
11	3.3	61	3.4	111	2.9	161	2.6	211	---
12	3.0	62	3.4	112	2.8	162	3.5	212	2.9
13	2.8	63	3.5	113	2.9	163	1.8	213	3.9
14	3.0	64	*36.5	114	3.5	164	2.8	214	*24.7
15	3.8	65	3.8	115	2.2	165	2.4	215	3.3
16	2.6	66	3.5	116	3.0	166	2.3	216	3.5
17	3.2	67	3.4	117	2.2	167	3.1	217	3.6
18	3.1	68	3.0	118	3.4	168	2.2	218	3.5
19	2.4	69	3.8	119	4.0	169	1.7	219	3.7
20	2.3	70	3.9	120	3.0	170	2.3	220	4.3
21	2.7	71	2.6	121	3.8	171	2.4	221	4.3
22	1.3	72	2.6	122	3.2	172	1.6	222	3.2
23	3.0	73	2.5	123	2.8	173	3.4	223	2.4
24	3.2	74	2.4	124	3.8	174	3.8	224	1.8
25	2.0	75	3.6	125	2.3	175	3.4	225	2.6
26	3.0	76	3.5	126	2.6	176	3.5	226	3.4
27	4.0	77	4.0	127	2.4	177	3.0	227	3.2
28	2.9	78	3.4	128	3.7	178	3.8	228	*25.0
29	3.5	79	3.0	129	2.1	179	3.6	229	*35.0
30	4.0	80	2.0	130	3.4	180	3.6	230	1.1
31	3.2	81	2.8	131	3.0	181	4.2	231	3.0
32	3.2	82	3.2	132	3.3	182	3.7	232	4.0
33	3.2	83	1.5	133	3.0	183	4.0	233	3.2
34	3.2	84	2.7	134	3.0	184	4.4	234	2.3
35	2.3	85	2.4	135	3.6	185	4.8	235	2.1
36	3.0	86	2.2	136	2.4	186	4.0	236	2.7
37	2.4	87	3.2	137	4.0	187	2.6	237	2.6
38	3.9	88	2.7	138	2.2	188	3.3	238	2.9
39	1.9	89	3.0	139	3.6	189	3.6	239	2.9
40	3.5	90	3.7	140	3.0	190	3.4	240	2.8
41	2.6	91	2.0	141	3.0	191	3.6	241	3.4
42	3.6	92	2.7	142	1.8	192	3.6	242	3.3
43	2.6	93	3.0	143	3.6	193	3.6	243	2.3
44	3.1	94	*36.0	144	6.7	194	3.1	244	3.2
45	3.4	95	3.5	145	3.2	195	3.7	245	2.8
46	3.5	96	3.4	146	3.2	196	*34.75	246	---
47	3.5	97	3.4	147	1.6	197	4.1	247	3.1
48	3.5	98	3.6	148	3.0	198	3.7	248	3.0
49	3.6	99	3.5	149	2.4	199	3.3	249	*26.0
50	3.2	100	3.8	150	4.0	200	3.7	250	3.0

*Cream.

TABLE 1 CONTINUED

Sample number.	Fat, percent.	Sample number.	Fat, percent.	Sample number.	Fat, percent.	Sample number.	Fat, percent.	Sample number.	Fat, percent.
251	3.7	288	2.9	325	*26.0	362	2.7	399	2.1
252	**0.5	289	3.2	326	—	363	3.3	400	2.0
253	*25.0	290	2.6	327	3.5	364	3.0	401	2.2
254	3.5	291	4.1	328	3.0	365	2.8	402	2.6
255	3.6	292	3.2	329	3.2	366	3.8	403	3.2
256	3.6	293	3.0	330	3.7	367	3.8	404	1.7
257	3.6	294	3.0	331	3.8	368	3.0	405	3.4
258	3.6	205	3.5	332	3.0	369	3.6	406	2.7
259	*25.0	296	3.1	333	2.6	370	3.6	407	2.8
260	*26.0	297	3.7	334	3.2	371	2.0	408	—
261	2.6	298	4.2	335	3.8	372	2.8	409	3.8
262	3.1	299	3.4	336	1.3	373	2.6	410	4.0
263	2.5	300	1.6	337	2.5	374	2.6	411	3.7
264	1.8	301	3.8	338	3.6	375	2.5	412	3.9
265	2.2	302	3.6	339	4.5	376	2.0	413	4.0
266	2.5	303	3.6	340	3.2	377	2.4	414	4.0
267	2.6	304	3.7	341	—	378	2.7	415	4.4
268	1.8	305	3.1	342	1.6	379	2.3	416	2.8
269	3.0	306	3.4	343	3.2	380	3.0	417	3.0
270	3.0	307	3.8	344	3.0	381	3.0	418	3.6
271	3.0	308	3.3	345	2.4	382	3.5	419	3.3
272	3.0	309	3.6	346	2.1	383	3.4	420	3.8
273	2.2	310	3.4	347	3.8	384	3.0	421	6.3
274	4.4	311	3.6	348	3.0	385	2.9	422	3.8
275	3.3	312	3.8	349	3.2	386	2.7	423	3.3
276	2.8	313	2.4	350	3.6	387	1.5	424	4.2
277	2.4	314	4.4	351	3.0	388	2.0	425	3.5
278	3.2	315	3.4	352	2.6	389	3.0	426	3.3
279	3.5	316	3.0	353	2.6	390	3.7	427	3.0
280	3.1	317	2.6	354	3.4	391	2.8	428	2.8
281	2.5	318	3.6	355	3.4	392	2.7	429	3.2
282	1.8	319	3.5	356	3.0	393	3.2	430	4.0
283	2.8	320	2.8	357	3.2	394	3.0	431	3.2
284	3.2	321	6.3	358	3.6	395	2.6	432	—
285	2.4	232	3.7	359	2.8	396	2.6	433	4.1
286	4.1	323	*15.3	360	4.5	397	2.8	434	3.6
287	2.6	324	3.4	361	3.2	398	3.0	435	3.6

*Cream. **Buttermilk.

This table contains 413 tests of milk and eleven tests of cream. One hundred thirty-four, or 32 percent of these samples are below the legal standard of 3 percent butter fat.

A study of the table will show that 20 of these samples are below 2 percent in butter fat and average only 1.6 percent, and that 68 samples or one-eighth of all are no higher than 2.5 percent, averaging 2 percent. The sale of such low grade milk is all the more significant when it is noted that 141 of these samples, one-third of all, tested as high as 3.5 and averaged 3.8 percent. These 141 samples are evidently whole milk just as produced by the cows.

TABLE 2. THE PERCENTAGE OF FAT AND AMOUNT OF SEDIMENT IN SAMPLES OF MILK COLLECTED IN CHICAGO DURING THE SUMMER OF 1905

Sample number.	Fat, percent.	Amount of sediment.	Sample number.	Fat percent.	Amount of sediment.	Sample number.	Fat, percent.	Amount of sediment.
426	3.3	Medium	459	2.0	Small	492	3.3	Small
427	3.0	.....	460	3.4	"	493	3.7	"
428	2.8	Medium	461	2.0	None	494	3.1	"
429	3.2	"	462	3.0	Medium	495	3.6	Medium
430	4.0	None	463	3.5	"	496	3.2	"
431	3.2	Extreme	464	2.9	Small	497	2.4	None
432	.....	Small	465	4.9	Large	498	4.6	Small
433	4.1	None	466	3.6	Small	499	3.3	"
434	3.6	"	467	4.0	"	500	2.8	.....
435	3.6	"	468	2.9	"	501	1.8	Large
436	2.9	Large	469	3.6	None	502	6.3	Medium
437	3.2	Medium	470	3.6	"	503	5.0	"
438	2.5	Large	471	3.6	Small	504	3.5	Large
439	2.4	"	472	3.0	"	505	3.5	Trace
440	7.5	"	473	4.2	Medium	506	5.6	Small
441	3.0	None	474	3.6	None	507	3.0	None
442	8.4	Medium	475	3.8	"	508	5.4	"
443	0.7	.....	476	3.4	"	509	3.0	Large
444	2.8	Medium	477	3.6	"	510	3.4	None
445	3.4	None	478	3.6	.....	511	3.2	Large
446	3.6	"	479	4.0	.....	512	6.4	Medium
447	3.6	"	480	4.0	None	513	4.8	Large
448	.....	Large	481	3.0	Large	514	3.6	Small
449	3.4	None	482	2.8	.....	515	2.8	Medium
450	3.0	"	483	3.8	Medium	516	2.0	None
451	3.8	Large	484	*15.0	.....	517	2.2	Small
452	3.3	.....	485	3.3	Small	518	3.2	None
453	3.8	None	486	2.8	"	519	3.8	Large
454	4.2	Small	487	3.3	"	520	3.0	Small
455	2.9	Medium	488	3.2	.....	521	3.2	Medium
456	4.0	.....	489	4.8	Large	522	3.8	None
457	3.7	Medium	490	4.0	Medium	523	3.2	"
458	3.1	"	491	.....	"	524	3.4	"

*Cream.

This table contains 95 tests of milk, of which 20 percent are low in butter fat. Of the 89 samples examined for sediment, 61 or over 68 percent contained sediment, 23 percent showing a small amount, 24 percent a medium amount, and 16 percent a large amount.

Sediment or filth in milk means a lack of clean methods in milking and handling the milk. Tables 2 and 3 show that two-thirds of 232 samples of milk sold in Chicago contained dirt of some sort. They also show that clean milk is produced by quite a number of the best dairymen and dealers.

A "trace" means an amount noticeable only by close examination; "small," an amount easily noticeable but covering only a small portion of the bottom of the bottle; "medium," an amount sufficient to form a complete ring, covering at least one-half of the bottom of the bottle. This last seems to be the amount that people will permit without serious protest. It is the ordinary quantity of barnyard filth that consumers get accustomed to seeing in the bottom of the bottle, and they apparently think it unavoidable. "Large" means an amount sufficient to cover the whole bottom of the bottle with a layer of dirt; "extreme," is too much to talk about; it is left to the imagination of the reader.

TABLE 3. THE PERCENTAGE OF BUTTER FAT, AMOUNT OF SEDIMENT, AND CONDITION OF CURD BY WISCONSIN CURD TEST IN MILK SAMPLES COLLECTED IN CHICAGO DURING THE SUMMER OF 1905.

Sample number.	Fat, percent.	Amount of sediment.	Wis. curd test Condition of curd.		Sample number.	Fat, percent.	Amount of sediment.	Wis. curd test Condition of curd.	
			Texture.	Odor.				Texture.	Odor.
525	3.2	Medium	Fair	Fair	575	3.4	Large	Good	Vile
526	3.2	None	Good	Good	576	3.3	Small	"	Good
527	3.6	"	Fair	Fair	577	3.0	Extreme	"	"
528	4.0	"	"	"	578	4.2	Small	"	"
529	3.8	"	Soft	Offens.	579	3.2	Medium	Fair	Fair
530	3.2	"	Good	Fair	580	3.0	Small	Good	Good
531	2.4	"	"	Good	581	4.3	.....	"	"
532	3.4	Small	"	"	582	4.0	Medium	"	Fair
533	2.8	Large	Gassy	Bad	583	3.6	None	Gassy	"
534	2.8	Medium	Good	Fair	584	4.4	.....	"	Bad
535	3.2	Extreme	Fair	Offens.	585	3.6	Large	Fair	Good
536	3.8	None	Good	Good	586	3.0	"	Gassy	Fair
537	3.8	Small	Gassy	Bad	587	3.8	None	Good	Good
538	3.5	.....	"	"	588	3.8	"	"	"
539	2.9	Large	"	Fair	589	3.4	Large	Gassy	Bad
540	.....	.....	Fair	"	590	3.2	"	"	Good
541	3.2	Medium	Good	"	591	3.2	None	Good	"
542	3.8	None	"	"	592	3.0	Small	Gassy	Fair
543	4.0	Large	"	"	593	4.0	None	"	"
544	4.0	None	Fair	Good	594	4.1	Medium	Good	Bad
545	4.1	Large	Soft	Bad	595	3.9	Small	"	Good
546	4.0	Small	Fair	"	596	3.4	Large	"	"
547	3.9	None	Good	Good	597	3.9	Small	Gassy	Fair
548	3.9	Small	"	"	598	4.4	"	Good	Bad
549	4.4	None	"	Fair	599	4.1	None	"	Good
550	3.8	Medium	Fair	Bad	600	4.1	"	"	"
551	4.6	"	Good	Good	601	3.5	Small	Gassy	"
552	3.8	Large	"	Bad	602	3.7	Medium	Good	"
553	3.8	Medium	Fair	"	603	3.6	None	"	"
554	4.4	"	Good	Good	604	4.0	Small	"	"
555	4.2	Large	"	"	605	4.1	Medium	Fair	Bad
556	3.9	"	Fair	Bad	606	3.5	None	"	"
557	3.9	None	Good	Good	607	3.5	Large	Gassy	"
558	3.6	"	"	"	608	3.4	Small	"	Fair
559	3.4	Medium	Fair	Fair	609	3.7	Medium	Good	Good
560	4.0	None	Good	Good	610	3.8	None	"	"
561	3.4	"	Fair	Fair	611	3.6	Large	"	"
562	3.6	"	Good	Good	612	4.4	Small	"	"
563	4.2	"	Fair	Fair	613	3.9	Large	Gassy	Bad
564	1.9	"	Good	"	614	3.0	Small	Good	Good
565	2.8	Large	Gassy	"	615	3.5	"	Gassy	Fair
566	3.8	Small	"	Bad	616	3.4	Large	"	"
567	4.0	Medium	"	Fair	617	3.3	Small	"	Good
568	0.8	Small	"	Bad	618	4.8	Large	"	Bad
569	2.8	None	Good	Fair	619	2.8	None	"	Fair
570	4.7	Medium	Gassy	"	620	3.9	Large	Good	Good
571	4.0	Large	Fair	Bad	621	4.1	Small	"	"
572	5.0	None	"	"	622	3.0	Large	Gassy	Bad
573	3.2	Medium	Soft	Fair	623	3.2	"	Fair	Good
574	3.4	"	Good	Good	624	3.0	Small	"	"

TABLE 3, CONTINUED

Sample number.	Fat, percent	Amount of sediment.	Wis. curd test, conditions of curd.		Sample number.	Fat, percent.	Amount of sediment.	Wis. curd test, conditions of curd.	
			Texture	Odor.				Texture.	Odor.
625	3.7	Medium	Good	Good	649	4.0	Small	Fair	Fair
626	4.2	Large	Gassy	"	650	3.6	"	Slimy	"
627	3.6	Medium	"	Bad	651	3.9	None	Fair	Fair
628	3.6	"	Good	Good	652	3.9	"	Gassy	Bad
629	2.7	Small	Gassy	Fair	653	3.7	"	"	"
630	3.2	None	"	Bad	654	3.4	Large	"	Fair
631	4.2	Medium	"	Fair	655	3.6	None	"	"
632	3.9	Small	Good	Good	656	3.4	Small	"	"
633	.....	Medium	Gassy	Fair	657	3.7	"	"	Bad
634	3.8	None	"	Bad	658	4.3	"	"	"
635	3.8	.....	"	"	659	3.9	None	Good	Good
636	3.3	None	Fair	Good	660	3.2	Small	"	"
637	3.9	"	"	Bad	661	3.9	Large	Gassy	Bad
638	3.8	"	Good	Good	662	2.9	"	"	Fair
639	3.7	Small	"	"	663	4.8	"	"	Bad
640	2.8	Medium	"	Bad	664	5.1	"	"	Fair
641	3.9	Small	Gassy	"	665	4.0	None	Fair	Bad
642	2.9	"	"	Good	666	4.5	Large	Good	Good
643	3.3	None	"	Bad	667	3.4	Small	"	Fair
644	3.2	"	Good	Good	668	4.6	Medium	"	Good
645	2.4	Small	Fair	"	669	3.2	None	Gassy	Bad
646	3.8	Extreme	Gassy	Bad	670	4.0	"	"	"
647	4.0	Small	"	"	671	3.6	Small	Fair	Fair
648	3.9	Large	"	Good	672	3.6	"	"	Bad

This table contains 148 tests of milk. Of the 143 examined, over 68 percent, the same as in Table 2, contained sediment; 26 percent showing a small amount; 17 percent, a medium amount; 21 percent, a large amount, and three samples were extreme. All of the samples were tested by the Wisconsin curd test;* 41 percent gave a good curd, only 39 percent had no unpleasant odor, and only 30 percent were good in both texture and odor.

Table 3 contains a much smaller percent of samples low in fat than do Tables 1 and 2. This is because they were collected in a different part of the city. A report of the average percent below grade all over the city means nothing, as some whole districts get uniformly good milk, while in others the bulk of the supply is poor.

It should be noted that, although milk without sediment generally gave a good curd, in many cases this rule did not hold true. Samples 527 to 531 contained no sediment and yet, of the five, only one gave a good curd with good odor. No. 529 had such a bad odor as to be offensive. Milk may have the visible sediment removed by various methods of clarification, but this does not remove the dissolved filth or the harmful germs that careless methods have introduced. Therefore we get poor curd and vile odors from some milk that is apparently clean.

*The curd test is used by cheesemakers to determine which patrons of the factory deliver bad milk. The developing of a soft, gassy, or bad smelling curd is evidence of dirt and gas-producing germs in the milk.

TABLE 4. THE PERCENTAGE OF BUTTER FAT, TOTAL SOLIDS, AND AMOUNT OF SEDIMENT IN SAMPLES OF MILK COLLECTED IN CHICAGO DURING THE SUMMER OF 1906.

Sample number.	Fat, percent.	Total solids percent.	Amount of sediment.	Sample number.	Fat, percent.	Total solids percent.	Amount of sediment.
673	4.2	12.14	Large	718	3.1	11.12	Small
674	3.4	11.85	"	719	3.1	12.12	Trace
675	3.8	12.26	"	720	3.3	.....	.....
676	3.6	11.72	"	721	5.0	13.00	Small
677	3.2	11.59	Extreme	722	4.4	12.68	"
678	3.4	11.58	"	723	12.0	.....	.....
679	3 0	11.35	Trace	724	2.7	.....	Medium
680	3.2	11.64	"	725	.....	.....	Small
681	3.6	10.12	Extreme	726	2.8	.....	Medium
682	2 6	11.87	Small	727	3.6	.....	None
683	2.8	11.56	Large	728	1.8	.....	Medium
684	8.0	16.80	Extreme	729	3.2	.....	None
685	4.0	16.65	Large	730	2.9	.....	Large
686	3.0	11.70	"	731	4.2	.....	"
687	4 8	13.76	"	732	2.5	.....	.....
688	4.0	12.70	"	733	3.3	.....	Large
689	2.9	11.10	Medium	734	3.6	.....	.....
690	3.6	11.92	"	735	3.3	.....	None
691	4.4	12.40	"	736	2.8	.....	Large
692	2.5	.....	Large	737	4.7	.....	.....
693	2.6	.....	"	738	3.7	.....	None
694	2.4	.....	Medium	739	3.3	.....	"
695	3.1	.....	Small	740	3.5	.....	"
696	2.8	.....	Medium	741	2.2	.....	.....
697	4.4	.....	Extreme	742	3.9	.....	None
698	3.2	.....	Large	743	2.8	.....	.....
699	3.2	.....	"	744	4.5	.....	None
700	3.6	.....	Small	745	3.4	.....	"
701	2.2	10.79	Medium	746	4.6	.....	.....
702	3 6	11.92	Small	747	3.0	.....	.....
703	3 0	11.15	"	748	3.0	.....	.....
704	*18.0	.....	.....	749	3.4	.....	.....
705	1.7	9.91	Medium	750	2.7	.....	.....
706	2 4	11.23	Large	751	3.1	.....	.....
707	1.5	9.8	Medium	752	*11.1	.....	.....
708	3.2	11.59	Trace	753	2.9	.....	.....
709	.....	.....	Large	754	2.9	.....	.....
710	3.8	12.56	Trace	755	1.9	.....	.....
711	3.6	11.92	"	756	2.4	.....	.....
712	2.2	10.06	Small	757	3.0	.....	.....
713	4.0	12 55	"	758	2.6	.....	.....
714	3.4	11.83	"	759	1.5	.....	.....
715	*17.5	.....	.....	760	2.6	.....	.....
716	3.0	11.47	Medium	761	2.4	.....	.....
717	1.8	10.41	Large	762	3.1	.....	.....

*Cream.

Of these 84 samples, 35 percent were low in butter fat. Over 67 percent of those tested for total solids were below the legal 12 percent standard. Sixty-seven were examined for sediment and 86 percent contained a visible amount, 18 percent being small, 18 percent medium, almost 30 percent large, and 7 percent extreme. There is evidently no improvement here over the milk collected in 1905.

TABLE 5. THE PERCENTAGE OF FAT FOUND IN 150 SAMPLES OF MILK COLLECTED, DURING THE SUMMER OF 1905, IN ONE OF THE DISTRICTS IN CHICAGO WHERE THE POORER WORKING PEOPLE LIVE.

Sample number.	Fat, percent.	Sample number.	Fat, percent.	Sample number.	Fat, percent.	Sample number.	Fat, percent.	Sample number.	Fat, percent.
7	3.0	40	3.5	116	3.0	224	1.8	273	2.2
8	0.9	41	2.6	117	2.2	225	2.6	274	4.4
9	3.2	42	3.6	118	3.4	226	3.4	275	3.3
10	2.0	43	2.6	119	4.0	227	3.2	276	2.8
11	3.3	71	2.6	134	3.0	234	2.3	277	2.4
12	3.0	72	2.6	135	3.6	235	2.1	278	3.2
13	2.8	73	2.5	136	2.4	236	2.7	279	3.5
14	3.0	74	2.4	137	4.0	237	2.6	280	3.1
15	3.8	75	3.6	138	2.1	238	2.9	281	2.5
16	2.6	76	3.5	139	3.6	239	2.9	282	1.8
17	3.2	77	4.0	140	3.0	240	2.8	283	2.8
18	3.1	78	3.4	141	3.0	241	3.4	284	3.2
19	2.4	79	3.0	142	1.8	242	3.3	285	2.4
20	2.3	80	2.0	143	3.6	243	2.3	286	4.1
21	2.7	81	2.8	160	3.0	244	3.2	287	2.6
22	1.3	82	3.2	161	2.6	245	2.8	288	2.9
23	3.0	83	1.5	162	3.5	247	3.1	289	3.2
24	3.2	84	2.7	163	1.8	248	3.0	290	2.6
25	2.0	85	2.4	164	2.8	261	2.6	291	4.1
26	3.0	86	2.1	165	2.4	262	3.1	292	3.2
27	4.0	87	3.2	166	2.3	263	2.5	293	3.0
31	3.0	88	2.7	167	3.1	264	1.8	294	3.0
32	3.2	89	3.0	168	2.8	265	2.2	295	3.5
33	3.2	90	3.7	169	1.7	266	2.5	296	3.1
34	3.2	91	2.0	170	2.3	267	2.6	297	3.7
35	2.5	92	2.7	171	2.4	268	1.8	298	4.2
36	3.0	93	3.0	172	1.6	269	3.0	299	3.4
37	2.4	113	2.9	221	4.3	270	3.0	371	2.0
38	3.9	114	3.5	222	3.2	271	3.0	372	2.8
39	1.9	115	2.2	223	2.4	272	3.0	373	2.6

Seventy-five samples or 50 percent of all are below the legal standard for butter fat.

This district is by no means typical of the poorest sections of the city, but is filled with busy working people who do not get large wages. It is largely supplied by small local dealers. Just one-half of the samples of milk examined were found below grade in butter fat. The percentage of milk below grade would have been still higher but for the fact that some of these samples were taken from the wagons of large dealers who visited the section. Eight samples obtained from one depot within three months were all below grade; the lowest contained 0.9 percent of butter fat and the highest 2.7 percent, the average being 1.78 percent. Four samples from another depot averaged only 1.77 percent; seven samples from a third depot tested from 2.2 to 2.8 percent; and six samples

from another depot ranged from 1.9 to 2.4 percent. But even in this district one depot was found from which six samples all tested up to grade and averaged 3.74 percent. These cases are given to show that the finding of samples below grade in this district was by no means an accident. The evidence of systematic skimming and watering of the milk is conclusive.

EVIDENCES OF SKIMMING AND WATERING

The milk as it comes from the country is almost universally up to grade. It will average 3.5 to 4 percent of butter fat. The small dealer buys one or more cans at the platform when the train is unloaded, takes the milk to his depot and sets it in a tank of ice water. The cream rises in the can, and before beginning to sell the milk, the dealer removes one or two quarts of cream, which is sold in small quantities at a good price and furnishes the larger part of the profit. The milk remaining in the can is stirred up and sold as whole milk at six cents per quart. Frequently water is added to take the place of the cream removed.

The temptation to make profits in this way overcomes any system of inspection that the city has yet established in these districts. By this means the poor are defrauded by people of their own class, and half nourished children are fed on skimmed and watered milk for which full price has been paid.

SUSPICIOUS OF THE COLLECTOR

A larger number of these samples would have been below grade if the dealers had not been suspicious of the collector. Frequently the salesman filled the collector's bottle to within an inch or two of the top from a large can of milk and added the rest from a smaller can that plainly contained cream. It was a common occurrence for the collector to wait his turn behind children who were buying milk. It often happened that their pitchers were filled from one can, and that when the collector stepped up he would be eyed sharply and a new can opened from which to fill his bottle. In many cases the milk was dipped off the top of the can carefully, without stirring the milk, and one such sample, No. 712, contained only 2.2 percent of fat and 10.06 percent of total solids. In one case after the bottle had been filled and the collector had closed it with a paper cap, the saleswoman appeared suddenly to think of something and asked for the bottle. It was returned to her, whereupon she drew a hairpin from a frowzy head, and, removing the cap from the bottle with the pin, poured out some of the milk and filled the space with cream from a pitcher. Replacing the cap, she handed the bottle back with a cordial smile, remarking, "I give you good milk." This sample (No. 664) contained 5.1 percent of fat, and was indeed good milk

so far as richness was concerned. A reference to the table will show that it was also rich in sediment.

In another case, a depot was found located in a dark kitchen. When the collector called for milk, the saleswoman was busy in the kitchen with her Monday's wash. The room was full of steam and the odor of dirty clothes. With her hands she wiped the soapsuds off each arm into the tub, and with her arms still wet she filled the milk bottle from a can standing in a tank near the cook stove. This sample (No. 468), contained 2.9 percent of fat, was off flavor when bought, and contained a small amount of sediment.

TABLE 6. THE PERCENTAGE OF FAT IN 95 SAMPLES OF MILK COLLECTED DURING THE SUMMER OF 1905 IN ONE OF THE RICHER DISTRICTS OF CHICAGO.

Sample number.	Fat, percent.	Sample number.	Fat, percent.	Sample number.	Fat, percent.	Sample number.	Fat, percent.	Sample number.	Fat, percent.
47	3.5	174	3.8	309	3.6	430	4.0	550	3.8
48	3.5	175	3.4	310	3.4	431	3.2	551	4.6
51	3.2	182	3.7	311	3.6	478	3.6	552	3.8
55	3.6	188	3.3	312	3.8	522	3.8	554	4.4
56	3.4	189	3.6	313	3.4	523	3.2	555	4.2
58	3.4	190	3.4	314	4.4	524	3.4	556	3.9
60	3.6	191	3.6	315	3.4	525	3.2	557	3.9
67	3.4	192	3.6	319	3.5	526	3.2	634	3.8
68	3.0	195	3.7	327	3.5	527	3.6	635	3.8
69	3.8	217	3.6	328	3.0	528	4.0	636	3.3
70	3.9	218	3.5	416	2.8	529	3.8	637	3.9
97	3.4	219	3.7	417	3.0	530	3.2	638	3.8
99	3.5	251	3.7	418	3.6	531	2.4	639	3.7
101	3.8	254	3.5	419	3.3	532	3.4	640	2.8
104	3.9	301	3.8	420	3.8	533	2.8	641	3.9
105	3.4	304	3.7	421	6.3	534	2.8	642	2.9
106	3.0	305	3.1	422	3.8	535	3.2	643	3.3
108	3.6	306	3.4	428	2.8	536	3.8	644	3.2
109	3.4	307	3.8	427	3.2	537	3.8	645	2.4

Of these 95 samples from one district only 9 percent are below grade.

CONDITIONS IN THE BETTER DISTRICTS.

Table 6 should be compared with Table 5. The samples of milk reported in Table 6 were collected in a residence district of rich people and well-to-do artisans. Here only 9 percent of the milk was found below grade, while in the poorer district, represented in Table 5, 50 percent of the milk was below grade. The richer district was for the most part served by the wagons of the best large dealers, who always handle a good grade of milk. The fact that 9 percent was found below grade shows that there is still room for improvement. The amount of sediment found here was much less

than in the poorer districts, but it was by no means entirely absent. The noticeable thing revealed by these two tables is that the poor people who needed the best of nourishment paid almost as much for poor milk as the rich people paid for good milk.

VERY LITTLE FORMALDEHYDE FOUND

The absence of preservatives was plainly noticeable in Chicago milk. Very few samples were found to contain formaldehyde, the most commonly used preservative, and the only one for which tests were made. The fact that the City Health Department has been able to teach the dealers that it is not safe to use preservatives indicates that the low percentage of fat, the dirty depots, and the practice of skimming could be done away with if a little more effort were expended in that direction.

CONDITIONS NOT SHOWN IN HEALTH DEPARTMENT REPORT

The bulletin of the Chicago Health Department for the week ending March 25, 1905, says: "The milk situation is very satisfactory at an unsatisfactory season. Of the 820 samples of milk and cream analyzed in the laboratory during the week, only 14 of milk and 30 of cream were found below grade, a proportion of 5.8 per cent." Undoubtedly this is a correct report of the samples tested. The defect in such a report is that it does not say where the samples were collected. If the samples were taken from the cans as soon as they were unloaded from the train, or if they were collected from the wagons of the best big dealers, nearly, if not all, the milk would be found up to grade. But when the writer collected milk from the dealers as it was sold to the people, he found it impossible to get any large number of samples that did not show a greater percent below grade than was reported by the Health Department. Reports as to the milk supply of a large city like Chicago should state how and where the samples were collected.

CONDITIONS IN TWENTY-SIX SMALLER CITIES

The milk conditions in the twenty-six smaller cities visited were found less satisfactory than in Chicago. Much more formaldehyde was discovered and a larger proportion of samples contained sediment. A great deal of criticism is always heard of the food supplies of large cities. But the chances of getting good milk, by anyone who knows the requirements of such milk, are better in Chicago, than in any of the twenty-six cities of 10,000 to 60,000 population in Illinois. Here again is shown the good that may be accomplished by inspection. The majority of the smaller cities have little or no inspection, and the dairymen and dealers have failed to bring the milk up to a high standard. The percent of butter fat averages higher than it does in some districts of Chicago, but the amount of sediment is very large.

TABLE 7. THE PERCENTAGE OF BUTTER FAT, TOTAL SOLIDS, AND AMOUNT OF SEDIMENT IN SAMPLES OF MILK COLLECTED IN 26 ILLINOIS CITIES OF MORE THAN 10,000 POPULATION DURING THE SUMMER OF 1906.

Sample number.	Fat, percent.	Total solids percent.	Amount of sediment.	Sample number.	Fat, percent.	Total solids percent.	Amount of sediment.
763	3.8	13.06	.....	813	3.3	.....	Medium
764	4.4	13.83	.....	814	4.3	.....	Small
765	4.0	13.70	.....	815	3.1	.....	Medium
766	3.0	11.60	.....	816	3.6	.....	Trace
767	4.0	12.30	.....	817	3.5	.....	Medium
768	4.4	.....	.....	818	3.4	.....	.....
769	4.6	12.52	.....	819	3.7	.....	.....
770	3.6	11.57	.....	820	3.1	.....	.....
771	3.4	11.15	.....	821	2.2	.....	.....
772	5.0	**13.75	.....	822	3.7	.....	.....
773	3.6	15.52	.....	823	*19.0	.....	.....
774	3.8	12.57	.....	824	4.6	.....	.....
775	5.4	14.10	.....	825	4.2	.....	.....
776	4.1	.....	.....	826	4.6	.....	.....
777	4.0	11.05	.....	827	3.5	.....	.....
778	3.6	**12.32	.....	828	3.7	.....	.....
779	4.0	**	.....	829	3.3	.....	.....
780	3.6	.....	.....	830	4.4	.....	Small
781	3.1	.....	.....	831	4.8	.....	.....
782	3.6	.....	.....	832	0.4	.....	.....
783	3.6	.....	.....	833	3.8	.....	Large
784	3.8	.....	.....	834	4.3	.....	.....
785	3.0	.....	.....	835	4.7	.....	Small
786	4.0	.....	.....	836	1.2	.....	.....
787	3.8	.....	.....	837	3.6	11.77	Large
788	3.4	.....	.....	838	4.5	12.15	None
789	4.5	.....	.....	839	*21.0	.....	Extreme
790	1.4	.....	.....	840	4.2	12.91	.....
791	4.1	.....	.....	841	8.0	.....	.....
792	2.4	.....	.....	842	3.4	12.68	Small
793	2.9	.....	.....	843	4.4	.....	None
794	4.2	.....	.....	844	4.0	12.50	"
795	3.1	.....	.....	845	2.0	.....	.....
796	3.8	.....	.....	846	3.7	11.69	.....
797	3.8	.....	Medium	847	3.6	11.92	Large
798	3.2	.....	.....	848	3.6	11.87	Small
799	3.9	.....	Large	849	4.3	12.58	"
800	4.3	.....	None	850	3.4	11.53	Medium
801	3.4	.....	"	851	3.1	10.42	Small
802	4.0	.....	Small	852	2.9	11.03	"
803	3.6	**	"	853	3.2	.....	.....
804	2.0	.....	"	854	3.8	12.06	Large
805	2.6	.....	"	855	3.2	10.84	Medium
806	2.0	.....	"	856	.....	.....	Large
807	3.0	.....	.....	857	4.2	12.81	.....
808	3.0	**	None	858	4.4	.....	.....
809	3.8	.....	Small	859	5.4	13.90	.....
810	4.1	.....	"	860	2.9	**10.03	.....
811	3.4	.....	Medium	861	3.6	10.99	.....
812	3.6	.....	Trace	862	3.2	10.76	.....

**Formaldehyde. *Cream.

The total solids and amounts of sediment are reported in all samples of sufficient quantity. Of samples collected on tables of hotels and restaurants this was manifestly impossible, hence the blanks in Tables 4 and 7.

TABLE 7. CONTINUED.

Sample number.	Fat. percent.	Total solids percent.	Amount of sediment.	Sample number.	Fat. percent.	Total solids percent.	Amount of sediment.
863	3.6	12.22	.....	913	3.2	11.26	None
864	3.8	11.96	.....	914	2.4	10.65	Small
865	3.3	12.06	.....	915	3.4	11.53	Medium
866	3.8	12.38	.....	916	3.3	11.46	"
867	4.6	13.07	.....	917	3.4	11.50	Small
868	4.0	12.75	.....	918	3.8	11.86	"
869	4.2	12.84	.....	919	3.0	.....	.....
870	4.0	12.85	.....	920	2.6	.....	.....
871	4.4	12.88	.....	921	3.5	11.47	Small
872	3.4	11.78	.....	922	3.6	12.09	"
873	4.7	13.44	.....	923	3.6	12.24	Medium
874	4.9	11.13	.....	924	7.4	15.15	Small
875	*10.5	.....	.....	925	2.4	** 9.78	Medium
876	4.0	12.50	.....	926	4.3	12.56	"
877	7.4	15.48	.....	927	1.7	9.56	"
878	3.0	.....	.....	928	2.0	9.27	None
879	3.4	11.58	.....	929	3.9	11.80	Medium
880	2.7	10.69	.....	930	3.4	11.55	"
881	*15.0	.....	.....	931	2.4	10.13	Small
882	3.4	11.33	Medium	932	4.1	12.22	"
883	5.0	13.55	Large	933	4.1	12.29	"
884	3.2	11.29	Medium	934	3.2	10.81	None
885	3.4	.....	.....	935	1.6	.....	.....
886	2.6	.....	.....	936	4.0	.....	None
887	3.8	12.03	Large	937	4.0	12.05	Medium
888	1.4	10.23	Medium	938	4.4	12.85	Small
889	3.9	12.50	Small	939	4.4	12.86	Medium
890	1.8	10.43	Large	940	3.4	.....	.....
891	4.0	.....	.....	941	3.7	.....	Extreme
892	*18.2	.....	.....	942	5.2	.....	Small
893	3.6	12.07	Medium	943	3.4	.....	Medium
894	1.4	9.98	"	944	3.9	.....	Small
895	3.4	11.78	"	945	4.4	.....	"
896	2.9	10.83	Large	946	3.5	.....	"
897	2.0	.....	.....	947	4.2	.....	Small
898	3.8	12.31	Small	948	3.8	.....	Medium
899	3.5	11.57	"	949	2.0	10.25	Small
900	3.8	12.43	Large	950	4.8	**12.96	"
901	1.8	.....	.....	951	3.1	10.74	"
902	4.2	12.79	Medium	952	3.0	11.10	Small
903	4.0	**12.42	"	953	3.4	11.58	"
904	3.0	11.35	Large	954	4.0	12.30	"
905	3.6	11.87	Small	955	1.0	** 9.60	"
906	3.5	11.95	Medium	956	3.0	11.70	"
907	3.9	12.15	"	957	4.4	12.68	Medium
908	2.9	10.93	"	958	3.6	**12.07	Large
909	4.3	12.53	Small	959	4.8	12.26	Medium
910	3.6	11.74	Medium	960	2.6	10.42	Small
911	4.5	12.94	Large	961	3.2	10.34	Trace
912	3.3	11.36	Medium	962	3.3	**12.59	Extreme

**Formaldehyde. *Cream.

TABLE 7. CONTINUED.

Sample number.	Fat, percent.	Total solids percent.	Amount of sediment.	Sample number	Fat, percent.	Total solids percent.	Amount of sediment.
963	3.0	11.02	Small	1013	1.8	9.78	Large
964	2.7	9.94	"	1014	.....	.....	Small
965	1.8	**10.16	None	1015	3.2	10.96	Trace
966	4.4	12.18	Extreme	1016	3.5	**11.70	Large
967	0.2	9.34	Small	1017	2.4	8.93	Small
968	2.8	8.06	"	1018	3.2	10.26	"
969	2.5	10.20	None	1019	3.4	9.45	None
970	3.0	**10.55	Large	1020	.....	.....	Small
971	3.8	**11.66	Small	1021	2.4	.....	Medium
972	3.2	10.61	Large	1022	2.4	10.25	None
973	3.4	.....	None	1023	3.5	11.70	Medium
974	3.8	.....	.....	1024	4.0	10.42	"
975	4.0	.....	Medium	1025	3.6	11.32	"
976	3.4	**	.....	1026	4.0	12.05	Small
977	3.0	.....	Extreme	1027	4.5	12.90	Medium
978	0.2	.....	.....	1028	3.4	11.58	Large
979	3.6	.....	None	1029	4.6	12.52	Medium
980	3.6	**11.57	Large	1030	3.6	11.32	Small
981	3.8	11.68	Medium	1031	6.6	15.22	"
982	3.2	10.71	"	1032	4.2	**12.54	Medium
983	3.5	11.57	Small	1033	3.0	11.92	.....
984	4.0	12.55	Medium	1034	2.0	10.10	.....
985	3.4	**11.33	Extreme	1035	*12.5	.....	.....
986	3.4	11.20	"	1036	0.8	9.58	.....
987	3.8	11.65	.....	1037	3.6	11.82	.....
988	3.2	**	.....	1038	2.8	11.23	.....
989	1.2	.....	.....	1039	*22.0	.....	.....
990	.....	.....	Trace	1040	1.4	10.08	.....
991	3.2	11.09	Small	1041	*18.0	.....	.....
992	3.2	11.31	"	1042	5.6	11.37	.....
993	2.6	**10.74	Medium	1043	*11.5	.....	.....
994	.....	.....	Small	1044	2.2	.....	.....
995	3.4	11.58	"	1045	3.2	11.71	.....
996	3.2	11.34	"	1046	0.4	7.35	.....
997	3.0	11.10	"	1047	2.6	10.62	.....
998	2.6	.....	.....	1048	2.3	10.76	.....
999	*23.0	.....	.....	1049	*22.0	.....	.....
1000	6.5	13.67	None	1050	0.2	.....	.....
1001	3.4	10.93	"	1051	*21.0	.....	.....
1002	4.4	12.48	.....	1052	3.5	12.0	.....
1003	3.8	11.71	.....	1053	4.0	11.35	Medium
1004	3.6	11.07	Trace	1054	3.4	11.10	.....
1005	3.4	11.47	Medium	1055	3.2	11.79	Small
1006	.....	.....	Small	1056	3.6	11.92	"
1007	2.8	9.11	Medium	1057	3.0	10.72	.....
1008	1.8	** 8.16	Small	1058	3.8	11.68	Medium
1009	2.8	9.41	Large	1059	3.2	11.71	Small
1010	4.2	12.54	Extreme	1060	2.8	10.98	"
1011	2.8	** 8.73	.....	1061	3.6	11.94	.....
1012	2.0	10.02	Large	1062	5.8	14.08	Small

**Formaldehyde. *Cream.

TABLE 7, CONTINUED

Sample number.	Fat, percent.	Total Solids percent.	Amount of Sediment.	Sample number.	Fat, percent.	Total solids percent.	Amount of sediment.
1063	4.0	12.85	Small	1086	3.3	.....	Small
1064	3.2	11.64	"	1087	3.8	.....	"
1065	4.0	12.57	None	1088	4.0	.....	"
1066	4.4	12.98	Small	1089	4.6	.....	"
1067	3.6	12.19	.....	1090	1.4	.....	None
1068	*30.0	.....	.....	1091	3.0	.....	.....
1069	*23.0	.....	.....	1092	3.7	.....	Small
1070	4.0	12.54	Small	1093	2.5	.....	"
1071	3.8	11.76	"	1094	3.0	.....	"
1072	4.6	13.02	"	1095	2.0	.....	"
1073	2.8	11.31	.....	1096	3.0	.....	"
1074	2.8	11.41	Small	1097	3.6	.....	None
1075	5.3	.....	.....	1098	3.6	.....	"
1076	3.0	11.55	Medium	1099	3.6	.....	"
1077	3.6	11.27	"	1100	4.0	12.50	Large
1078	2.6	.....	.....	1101	4.0	12.40	None
1079	3.6	11.87	Extreme	1102	4.2	12.44	Small
1080	3.4	11.48	None	1103	3.6	11.93	Large
1081	3.4	11.95	Large	1104	.....	.....	Small
1082	2.8	11.21	"	1105	3.4	11.43	"
1083	3.6	.....	"	1106	3.6	11.67	Large
1084	3.4	.....	Medium	1107	3.4	12.08	"
1085	3.6	.....	Small				

*Cream.

This table contains 325 tests of milk. Nineteen percent are below the legal standard for butter fat. Of the 209 samples tested for total solids, 63 percent are below the standard. Two hundred twelve samples were examined for sediment and 88 percent contained a visible amount. Twenty-four samples or 7 percent contained formaldehyde.

ONE OF THE WORST DEPOTS

A large proportion of the milk sold in the smaller cities is delivered to the consumer by the dairyman who produces it. The milk depots are no better than those in Chicago. One large company in a city of at least 30,000 population had a very filthy salesroom in the front part of its bottling plant. This room had a rotten floor which was strewn so deep with an accumulation of dust, cinders, scraps of paper and discarded bottle-caps that this rubbish was scraped up in piles by the feet of the attendants as they walked. On floor and counter were puddles of spilled milk upon which the flies descended in such numbers as to blacken spots a foot square. The unsanitary condition of this place could hardly be exaggerated. The health commissioner in the city assured the collector that the

milk situation was being looked after vigorously and that no milk below grade could be found. In an hour's walk seven samples were collected, six of which were below grade in butter fat, two contained formaldehyde, and all but one contained sediment.

FEW CLEAN BARNs

Very little of the milk supplied to these cities was produced in improved or sanitary dairies. The cow barns and the condition of the cows themselves, as witnessed by the writer, were often a disgrace to civilized people. Dark stables with no ventilation were seen frequently; also, cows lying and standing on dirty plank floors without bedding, and on earth floors trampled full of ruts where liquid manure was standing. One man with a herd of 50 cows supplying milk to a town of 10,000 inhabitants, was asked if he would like to have his customers see how the milk was produced. He dropped his head and admitted that the less he advertised his place the better off he was.

CONDITIONS WITHOUT AN EXCUSE

In this day when spitting on the sidewalks is forbidden, when some of our best grocery firms examine their clerks every morning to see whether or not their clothes are clean, when thousands of dollars are spent to make dry-goods stores light and sanitary, we permit men to handle, in dusty, dirty, filthy, and foul smelling stables, the milk which we and our children are to drink. We permit men with colds and coughs to expectorate on the feed the cows are to eat, and on every part of the floor where the milk is handled. Men in dirty clothes that have done service for months without washing, sit down by cows whose thighs and udders are covered with manure, and proceed to milk into a pail fourteen inches in diameter. The writer has repeatedly observed these conditions the past two years, and they were found in three out of five herds visited on one day within two weeks of the time of this writing.

FILTH THE MOST DANGEROUS

The use of preservatives, although bad enough, is not nearly so serious a question as that of unclean milk. No doubt children are occasionally killed by the use of preservatives, but the number who die each year from a continual use of dirty milk is enormous. The

correctness of this statement has been proved by the work of such men as Nathan Straus in New York City and Dr. G. W. Goler in Rochester, New York.*

Much has been written against the milkman because a few cases of scarlet fever are traced to the milk supply, but these cases are as nothing when compared with the total amount of sickness and the number of deaths occurring each year in every city in the land as a direct result of filthy methods of producing and handling milk.

However, in pleasing contrast, several places were visited where the cows were stabled in clean, light, well-ventilated barns with cement floors and dust proof ceilings, and the cows themselves were well bedded and kept clean.

TABLE 8. THE PERCENTAGE OF FAT IN SAMPLES OF MILK COLLECTED IN HOTELS AND RESTAURANTS IN 28 ILLINOIS CITIES DURING 1905 AND 1906.

Sample number.	Fat, percent.	Sample number.	Fat, percent.	Sample number.	Fat, percent.	Sample number.	Fat, percent.	Sample number.	Fat, percent.
1	3.0	731	4.2	845	2.0	967	0.3	1046	0.4
2	3.0	732	2.5	853	3.2	977	3.0	1047	2.6
3	3.3	734	3.6	885	3.4	978	0.2	1048	2.3
4	3.2	741	2.2	886	2.6	988	3.2	1050	0.2
5	2.2	743	2.8	888	1.4	989	1.2	1078	2.6
6	3.9	798	3.2	890	1.8	997	3.0	1079	3.6
110	2.8	804	2.0	897	2.0	998	2.6	1081	3.4
111	2.9	805	2.6	898	3.8	1008	1.8	1082	2.8
132	3.3	806	2.0	901	1.8	1021	2.4	1090	1.4
133	3.0	807	3.0	919	3.0	1033	3.0	1091	3.0
300	1.6	812	3.6	920	2.6	1036	0.8	1093	2.5
368	3.0	832	0.4	935	1.6	1038	2.8	1096	3.0
726	2.8	836	1.2	955	1.0	1040	1.4	1108	1.0
728	1.8	841	8.0	965	1.8	1044	2.2	1109	1.2

This table reports 70 tests, of which 44 or 63 percent are below grade in butter fat.

Table 8 shows samples collected in hotels and restaurants in all the Illinois cities visited, including Chicago. Of these, 63 percent were low in fat. Many samples secured from glasses of milk served at the table were found to be separator-skimmed milk. Serving such milk is a violation of the laws of Illinois. This milk is paid for at a high rate, never less than 20 cents per quart, and selling skimmed milk at such a price is downright and insolent robbery. Of two samples obtained at the table in one of the largest and highest-priced hotels in Chicago, one contained 2.2 percent of fat,

*See "But a Thousand a Year," by Dr. Goler, and "The Influence of a Pure Milk Supply on the Death Rate of Children" by Mr. Straus.

and the other 2.8 percent. And this milk was paid for at the rate of ten cents per glass or forty cents per quart.

THE DIFFICULTIES OF THE CASE

Milk is a standard food in every family, and for little children and some invalids it is a positive necessity. Considering the surroundings in which milk must be produced and handled, it is peculiarly difficult to keep it clean. Milk is an excellent medium for the growth of germs which are everywhere present, and the hot months are the most favorable to bacterial growth. The death rate of any city will show that more children die during July and August than at any other time of the year, and that a majority of them die from bowel trouble. What has already been accomplished toward furnishing children with pure milk during the summer months has greatly reduced this mortality. It is plainly the duty of every city and of every citizen to see that the contamination of milk is reduced to the lowest possible point.

WHY IMPROVEMENT COMES SLOWLY

It no doubt costs more money to produce clean milk than to supply the usual quality, and the dairyman thinks he cannot afford to improve his conditions. Consumers are desperately afraid of an increase in the cost of this food. The fear that the price of milk would be advanced has kept many a city council from passing an ordinance requiring adequate milk inspection, and it also has prevented health commissioners from enforcing inspection ordinances. Such an attitude is manifestly absurd. Milk is one of the cheapest foods on the table. The idea that great outlay for equipment is necessary to produce clean milk is also erroneous. Milk of the best quality may be produced in an ordinary barn if the proper care be taken. The trouble has not been lack of expensive equipment, but lack of clean methods.

REQUIREMENTS FOR CLEAN MILK.

HEALTHY COWS

All cows that are weak, extremely thin, and coughing must be removed from the herd. Milk from unhealthy cows is not safe to use, and only cows in good health can make profitable use of the food given them. The herd should be inspected at regular intervals by a competent veterinarian.

HEALTHFUL BUILDINGS

It is necessary to have healthful buildings and to keep them clean, but such buildings need not be expensive. The four essentials are light, ventilation, a proper floor, and a comfortable tie. Window glass is almost as cheap as lumber. The King system of ventilation can be installed by any carpenter or by the farmer himself at the cost of a few feet of lumber and a few days' work. A cement floor is but little more expensive than a good wood floor, and is many times more durable. Planks laid over the cement where the cows stand will prevent injury to the animals. A comfortable tie is only a little more expensive than an awkward rigid stanchion. A good swing stanchion is not uncomfortable to the cow. All of these things could be put into the ordinary Illinois barn with but little trouble, and would pay for themselves in less than a year in the increased efficiency of the herd.

THE BARNYARD

Much of the dirt in milk comes from the barnyard. The cows wade knee deep in mud and manure and carry this filth into the barn on their legs, tails and udders. It is difficult to clean off and the careless milker makes little attempt to prevent the constant shower of dirt falling into the pail. The yard should be well drained and graded up with cinders or gravel. If drainage cannot be obtained in any other way, the rule should be, raise the barn and grade up to it.

CLEANING THE COWS

Before milking the cows should be gone over with a brush and all loose particles of dirt removed. This need not take more than thirty seconds per cow. The cow's udder comes in contact with the floor and cannot be cleaned by simply brushing. It is very important that the udder should be washed with a damp sponge or cloth, and this may take thirty seconds more. The sponging will be doubly effective if the long hairs around the teat and lower part of the udder are cut short. Each man who is to milk twelve or fifteen cows will need to spend twelve or fifteen minutes in cleaning them. This cleaning is very simple and inexpensive, and yet nine out of ten farmers scout the idea as preposterous. Every farmer will spend hours cleaning his horses, because he is ashamed to have the public see them dirty. It would be much more reasonable to spend less time cleaning his horses and more time cleaning the animals that produce the milk his children are to drink. It is time for the

consumer to demand that every individual dairyman supplying milk for city consumption shall use at least common decency in its production.

Clean cows, clean clothes, and clean dry hands for the milker should be the unvarying rule of every dairy. Special milking suits should be worn and frequently washed.

UTENSILS

A small-topped pail would prevent a large amount of dirt from falling into the milk. Pails, cans, strainers, coolers, and every other utensil that comes in contact with the milk should be washed clean and sterilized. Sterilizing means heating to 212°F. It may be done by boiling water or by steam. It cannot be done by starting with boiling water in one can and pouring it from can to can to clean half a dozen. The easiest way to do thorough work is to use steam.

COOLING THE MILK

Even with the best of care, a great many germs will fall into the milk; these will do little harm if they are kept from growing, and this can be accomplished by cooling the milk quickly and keeping it cold. The best results require that the cooling tank be kept down to 50°F. If the well water is below 55°F. and the milk is quickly cooled to that temperature by stirring, it will do very well, although that is not an ideal cooling. If ice can be secured it should be added to the water in the tank. Aeration in pure air over a cool surface is beneficial but not absolutely necessary.

TRANSPORTATION

The milk should be put into bottles closed with paraffined paper caps. This is the only practical method for delivering milk in the best condition, uncontaminated by the dust of the street. In any case, in order to protect the milk from the heat of the sun, the delivery wagon should be covered. It may be kept cool while on the route by cracked ice put into the boxes around the bottles. When milk is dipped from open cans into uncovered vessels more or less dirt is almost sure to be in the pitcher or pan and more falls in from the dusty air.

Milk that has been properly cared for at the dairy may be entirely ruined by warming up to 70°F. on the wagon. Delivered at such temperature it cannot be expected to stay in even fair condition for many hours.

When the milk is hauled by the dairyman to the bottling plant of a dealer, or to the train, the cans should be covered with a heavy canvas, and it is still better to have a closely covered wagon.

Milk that is bottled in the country and shipped by rail is generally packed in iced boxes, and reaches the city in excellent condition.

Milk shipped in cans on the ordinary milk train is not kept so cool as it should be in warm weather. This Experiment Station found by test that cans of milk shipped thus 40 miles into Chicago warmed up from 56° at the farmer's spring house to 64° at the train platform in Chicago. A dozen cans varied in temperature from 62° to 70°F. This milk warmed up several degrees more while going through the streets of Chicago to the bottling plant, which is a severe strain on the keeping quality of the milk. The railroad should provide refrigerator cars for summer use. The milk reaching New York City from a distance of 350 miles is often kept in better condition in refrigerated cars than milk shipped 50 miles in ordinary cars.

BOTTLING

The ideal way to deliver milk is in bottles, but this is true only when the bottles have been properly treated. During these investigations the writer found that very few dealers, especially in the smaller cities, sterilized their bottles before filling. These bottles when filled are left at hundreds of houses, and in some cases enter sick rooms, or are washed in the same pans with dishes from sick rooms; they are frequently used by the servants to hold all kinds of mixtures, and sometimes are carried open through dusty streets and stored in dusty rooms. It is absolutely wrong to fill any bottle with milk without first washing it thoroughly and then subjecting it to live steam for at least ten minutes.

DANGEROUS BOTTLING

In one Chicago bottling plant owned by a firm that operates a number of wagons, the writer found a large truck loaded with bottles ready to be filled. These were not even washed clean. The means of cleaning were an almost hairless brush on a small turbine wheel. The bottles were placed in lukewarm water, given a whirl on the bald-headed brush, and rinsed in an adjoining tank, without ever being put into water hot enough to scald the hands of the workmen. In this same depot a shelf over the back part of the tank had become so well covered with dirt that oats spilled there had taken root and were growing luxuriantly. The horse stable was in the

same building with the bottling room, and separated from it by a driveway from which open doors communicated with both. The pig-pens, chicken sheds, and horse stables of the farmer are "innocent bystanders" as compared with the evil possibilities in unsterilized milk bottles, such as were found in this place.

THE DUTY OF THE CONSUMER

Not only the producer and dealer but the consumer has something to do in securing a supply of clean, sanitary milk. He should appreciate the superiority of good milk, should know what such milk is and which dealers are selling it in his city. Every dairyman who tries to meet the modern requirements of good milk should be given trade in preference to the man who is wedded to unsanitary customs. Many a consumer will use the product of poor cows handled in unsanitary buildings, rather than pay a cent or two more per quart for clean, safe milk. This is a direct bid for poor milk.

If the consumer would visit the dairies of his city and find out for himself how the milk is handled it would result in good to all concerned. A number of milkmen have admitted that they would be ashamed to let their customers see how the milk is produced. An intelligent demand for clean milk would go far to improve the situation. It would at least set the dairyman to thinking if a few questions like the following were asked him:

"Are all your cows healthy?" "Do you keep them clean?" "Is your barn light and well ventilated?" "Are your bottles sterilized each time before filling?"

If, in making a round of the dairies, the consumer should find an up-to-date, sanitary place and see the extra care taken to produce good milk, it is very likely he would be willing to pay a little more money for such milk.

The consumer is often to be blamed for the milk souring quickly. First-class milk left at his home in a clean bottle and at a low temperature, may be sour or off flavor twelve hours later because it was left standing in a warm kitchen for a few minutes, or was poured out into a pan that had been washed in the dish-pan and wiped on a towel that had done service for all kinds of dishes for several days. Milk should not be left standing in the sun a minute after the milkman leaves it. The consumer should have a place for the milk inside the house or in the shade, and should see that the deliveryman puts it there. It should be taken immediately to the coolest place in the house and left in the bottle without removing the cap until wanted for use, or he cannot blame the milkman if the

milk spoils. The consumer does not deserve good milk unless he discriminates in favor of such milk and takes the proper care to keep it good after it reaches him.

At present prices the cost of milk produced in Illinois in such a manner as has been recommended here, should not much exceed 8 cents a quart delivered, and at this price it is cheaper food than meat. It cannot be produced and delivered for 5 cents; six cents leaves too small a margin of profit for the honest dealer; 7 cents will do in many localities. However, these prices do not apply to special or fancy milk. When the people insist on having good milk and are willing to pay a fair price for it, the milkmen will fall into line quickly and supply the demand.

In one case a dairyman advertised the exact way in which he produced clean milk, and offered it at 2 cents per quart above the regular price. Soon he found more customers than he could supply.

THE DUTY OF THE CITY

All large cities have found themselves compelled to regulate and inspect their milk supply. No officials of the Federal Government, or even of the State Pure Food Commission, can visit any number of towns often enough to be depended upon for regular inspection of the milk and the dairies. This must be taken up vigorously by each municipality itself. The city owes to its citizens such supervision as shall protect the lives of their children as well as guarantee them the worth of their money spent for milk.

Inspection need not be made very often. In a city of from 10,000 to 20,000 population, one inspector can gather all necessary samples of milk, inspect dairy conditions, meats, fish, and water, besides testing the milk. Good inspection means that a competent person must be always on the lookout to see that proper regulations are observed. Samples should be gathered every day in some part of a large town (50,000 inhabitants) or once a week in all parts of a small town. No time should be set for taking samples; the inspector should be irregular in his visits. The dairyman must never know when the inspector is coming, but should understand that he may come at any time.

The apparatus required for the analysis of milk is not expensive. The butter fat and total solids may be determined by the use of the Babcock test and the lactometer. These will give all the information necessary regarding the composition of the milk. The presence of preservatives may be detected by simple tests that anyone may learn within a few hours. Often it will be found convenient for a town to employ the high school chemist to do this testing. The cost of all the apparatus needed will not exceed \$25.

The city does not need to go into court to get rid of dishonest dealers. All that is necessary is to publish the results of all an-

alyses and inspections, as soon as made, in the daily papers, naming each dairyman or dealer in connection with the results concerning his milk. The honest dealers will be glad to have the public know the kind of milk they are selling. The people will soon stop buying from the men who furnish a poor grade of milk, or who will not clean up their dairies or plants.

City officials and consumers are here cautioned against accepting pasteurization as a remedy for unsanitary methods of production. Clean milk pasteurized is good, but impure milk cannot be made right by pasteurization. Every firm that advertises pasteurized milk should have its source of supply inspected as well as its methods of pasteurization.

It is the duty of the city to make sure that its health commissioner knows something about milk and has backbone enough to enforce the law. One commissioner visited said that he did not know anything about the milk sold in his town and did not want to know. He said that he had enough to do without getting into "that muss." Twenty-four samples collected in that town at a later date showed 17 below the legal standard in total solids, 8 below in butter fat, 7 containing formaldehyde, and all containing sediment. Evidently it was a "muss." Another health commissioner wrote the Dairy Department asking what preservatives, if any, could be used in milk without being harmful and without violating the law. And what seems stranger still, both these men were physicians. A number of health commissioners absolutely refused to move in the matter of milk inspection because they did not care to stir up the enmity of the milk dealers. Such men should be sharply rebuked and be made to give way to men who have some conscience and courage.

DAIRY SCORE CARD

Note—There is printed herewith a score card for dairies prepared by the author of this bulletin and also for creameries, which is a modification of the one suggested by Professor R. A. Pearson of Cornell University, and in actual use in the City of Cleveland. Since these were prepared the National Dairy Association has appointed a committee of which Professors Trueman and Pearson are members, to consider and report at a later meeting upon the most acceptable form of score cards. When the report will be made and accepted is uncertain. In the meantime something of the kind is needed.

Professor Trueman is a pioneer in the idea of a score card for dairies and creameries, and the station prints the following as representing the best available information up to the time of the preparation of the text of this bulletin.

E. DAVENPORT, *Director.*

SCORE CARD FOR DAIRY INSPECTION

Owner or lessee of farm,.....
 Town,..... State,.....
 Number of cows,..... Quarts of milk produced daily,.....
 Is product sold at wholesale or retail?.....
 If shipped to dealer give name and address.....
 Permit No. Date of Inspection,.....190....

I. Health and protection of the herd.	(No score will be given until all sick cows have been removed. All cows coughing or emaciated, must be isolated and their milk must not be used.)	Perfect score	Points allowed	Remarks
	Cows in good vigorous condition, not too thin.....	2		
	Ventilation in stable.....	6		
	Light.....	4		
	Pure food and water.....	4		
	Comfortable barn,.....	4		
		<hr/> 20		
II. Cleanliness of the cows and their surroundings.	Cows all clean..... Stable clean..... Air pure, no unsanitary buildings, or manure pile within 200 feet of stable..... Stable yard clean and well drained.....	8 6 3 3	<hr/> 20	
III. Utensils, their construction, and cleaning.	Utensils clean, free from rust, sterilized Pure water for cleaning, and protection of its source from contamination..... Utensils constructed with seams filled with solder, so as to be easily cleaned... Proper place for cleaning and storing utensils, including steam boiler and sterilizing oven.....	8 6 2 4	<hr/> 20	
IV. Milkers and milking.	(All attendants must be healthy, and must not live in a house where any communicable disease exists.) Milking done with clean, dry hands, and cows udder sponged or wiped with damp cloth before milking..... Special suits used for milking, or regular suits well brushed..... Use of small top milk pail.....	10 5 5	<hr/> 20	
V. Handling the milk.	Prompt cooling to below 55°F. and holding at low temperature..... Handling milk in sanitary room..... Protection during transportation.....	10 5 5	<hr/> 20	
Total score.....		100		

TOTAL SCORE
 96 or above
 90 " "
 80 " "
 Below 80

EACH DIVISION
 18 or above
 16 " "
 12 " "
 Any division below 12

DAIRY
 Excellent
 Good
 Medium
 Poor

DIRECTIONS FOR SCORING

		Perfect score.
I. Health and protection of the herd.	Condition of cows: If vigorous and in fair flesh, 2; if very thin, 1; if weak and thin, 0.	2
	Ventilation: Good system, 6; poor system, 3; no system, 0.	6
	Light: 3 sq. ft. per cow, 4; 2 sq. ft. per cow, 3, one sq. ft. per cow, 2; less than 1 sq. ft. per cow, 0.	4
	Food and water: Pure, with source of water protected, 4; fair, 2; poor, 0.	4
	Barn: Comfortable, 4; fair, 2; bad, 0.	4
II. Cleanliness of the cows and their surroundings.	Cows all clean, 8; fairly clean, 4; dirty, 0.	8
	Stable clean, manure removed twice daily, 6; fair, 3; dirty, 0.	6
	Stable air: Pure and free from dust, 3; fair, 2; bad, 0.	3
	Stable yard clean and dry, 3; fair, 2; bad, 0.	3
III. Utensils.	Utensils free from dents, and rust, and sterilized, 8; in fair shape, 4; bad and not sterilized, 0.	8
	Pure water, 6; fair, 3; bad, 0.	6
	Utensils constructed with seams filled with solder, 2; bad construction, 0.	2
	Proper arrangement for cleaning and sterilizing, including washing sink, steam boiler, and sterilizing oven.	4
IV. Milkers and milking.	Milking done with clean, dry hands, udder sponged clean, foremilk rejected, 10; udder brushed but not sponged, hands clean, foremilk rejected, 6; udder fairly clean, other items all right, 4; all points of clean milking, disregarded, 0.	10
	Clean suits for milking, 5; fair, 3; bad, 0.	5
	Use of small top pail, 6 in., with hood, 5; small top 6 in., no hood, 3; 8 in. top, 2; large topped pail, 0.	5
V. Handling the milk.	Prompt cooling to below 55°F., 10; cooling not prompt but within an hour or two, 5; neither, 0.	10
	Room clean, well ventilated for handling milk, 5; fair, 3; bad, 0.	5
	Covered wagon, 5; milk covered with heavy canvas, 3; no covering, 0.	5
		100

CITY OF.....

Public Health Department

SANITARY INSPECTION OF CITY MILK PLANTS

Owner or manager,.....Trade name,.....
 City,.....Street and No.,.....State,.....

Number of wagons,.....Gallons sold daily: { Milk,.....
 Cream,.....

Permit or license No.,.....Date of inspection,,.....190...

	Score		Re- marks
	Per- fect	Al- lowed	
Milk Room			
Location.....	10		
.....			
.....			
Construction,.....	10		
Floor (3).....			
Walls and ceiling (3).....			
Drainage (4).....			
Cleanliness.....	10		
Light and ventilation.....	10		
Equipment:.....	20		
Arrangement (3).....			
Construction.....			
Sanitary (2).....			
Durability (2).....			
Condition (3).....			
Cleanliness (10).....			
Milk			
Handling (12).....	20		
Storage (8).....			
Sales Room			
Location (2).....	10		
Construction (2).....			
Equipment (2).....			
Cleanliness (4).....			
Wagons			
General appearance (2).....	10		
Protection of product (3).....			
Cleanliness (5).....			
Total.....	100		

Sanitary conditions are: Excellent,.....Good,.....Fair,.....Poor.....

Suggestions by inspector:.....

.....

(Signed).....Inspector.

DIRECTIONS FOR SCORING

MILK ROOM

Location: If not connected by door with any other building, and surroundings are good, 10; when connected with other rooms, such as kitchen, stables, etc., make deductions according to conditions.

Construction: If good cement floor, and tight, smooth walls and ceiling, and good drainage, allow 10; deduct for cracked or decayed floors, imperfect wall, ceiling, etc.

Cleanliness: If perfectly clean throughout, allow 15; deduct for bad odors, unclean floor and walls, cobwebs, unnecessary articles stored in room, etc.

Light and Ventilation: If window space is equivalent to 15 percent or more of the floor space, allow 5; deduct 1 point for every 3 percent less than the above amount.

Equipment:

Arrangement: Allow 3 points for good arrangement; if some of the equipment is out of doors or so placed that it cannot be readily cleaned, make deductions according to circumstances.

Condition: If in good repair, allow 4 points; make deductions for rusty, worn-out, or damaged apparatus.

Construction:

Sanitary—If seams are smooth and all parts can be readily cleaned, allow 2; deduct for poor construction from sanitary standpoint.

Durability—If made strong and of good material, allow 2; deduct for light construction and poor material.

Cleanliness—If perfectly clean, allow 8 points; make deductions according to amount of apparatus improperly cleaned.

MILK

Handling: If milk is promptly cooled to 50°F. or lower, allow 12 points; or if pasteurized at a temperature of 140°F. or above and promptly cooled to 50° or lower, allow 12 points. Deduct 1 point for every 2° above 55°. If milk is pasteurized imperfectly, deduct 6 points. If milk is improperly bottled or otherwise poorly handled, make deductions accordingly.

Storage: If stored at a temperature of 45°F. or below, allow, 8 points. Deduct 1 point for every 2° above 45°.

SALES ROOM

Location: If exterior surroundings are good and building is not connected with any other undesirable conditions, allow 2; for fair conditions allow 1; poor conditions, 0.

Construction: If constructed of material that can be kept clean and sanitary, allow 2; for fair construction allow 1; poor construction, 0.

Equipment: If well equipped with everything necessary for the trade, allow 2; fair equipment, 1; poor equipment, 0.

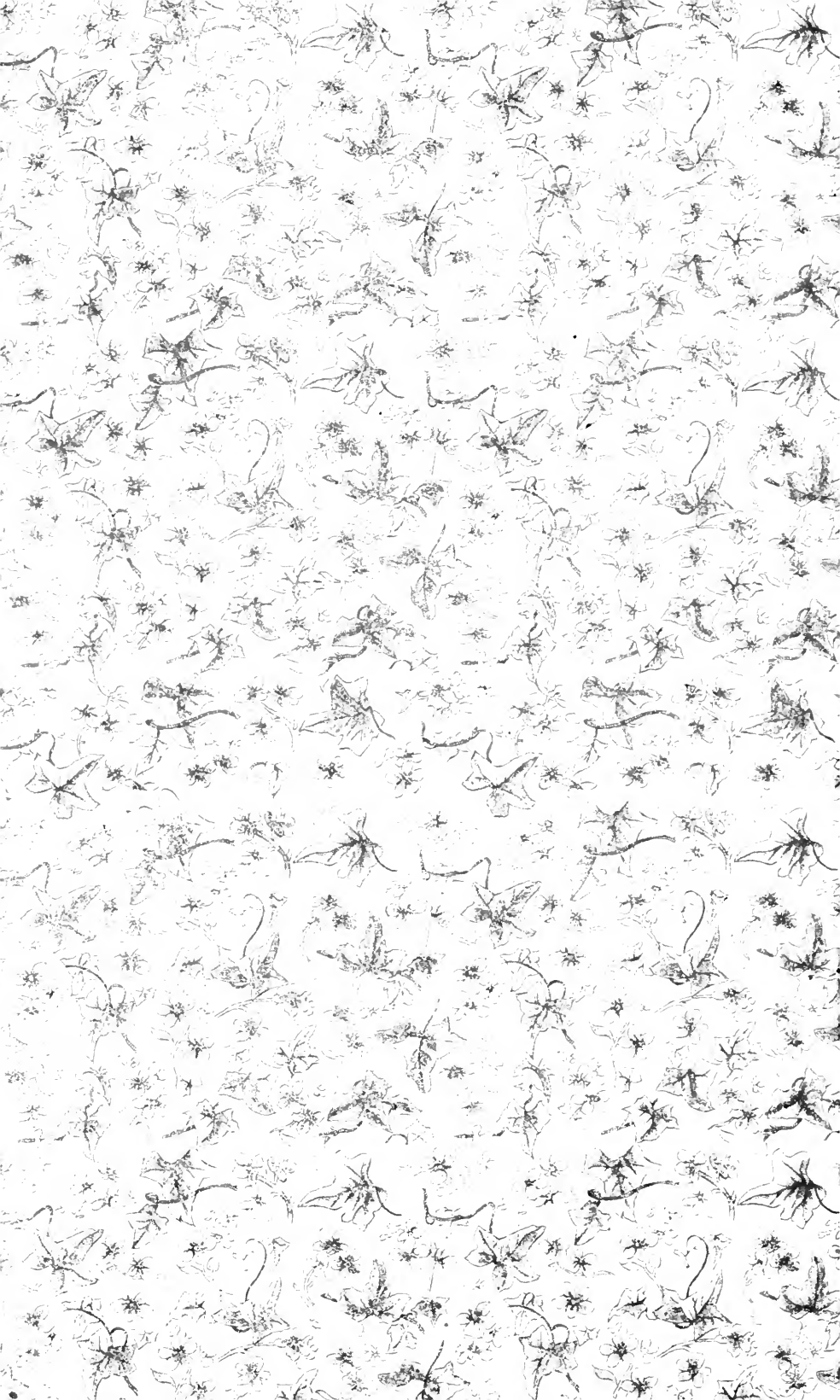
Cleanliness: If perfectly clean, allow 4 points; if conditions are good, 2; fair, 1; poor, 0.

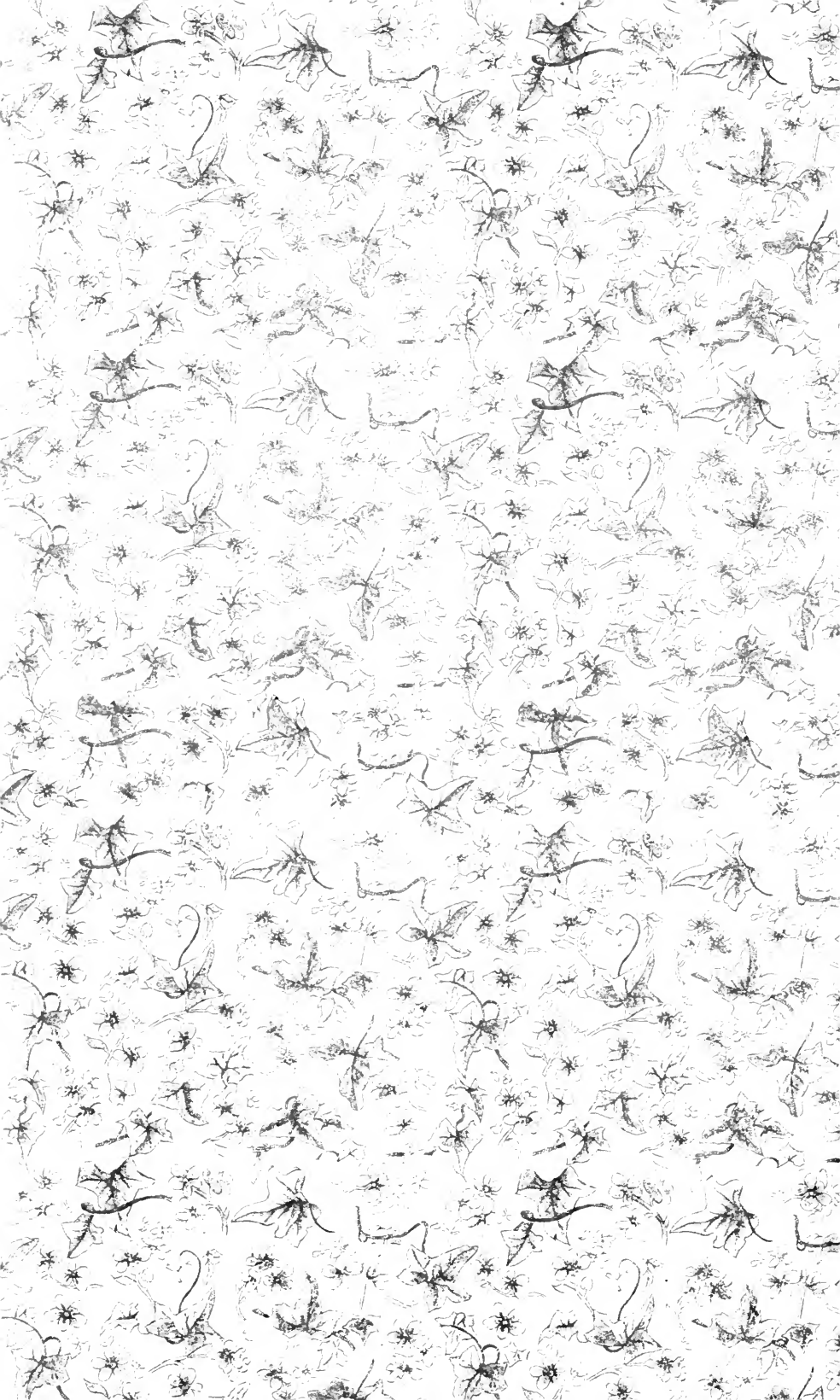
WAGONS

General Appearance: If painted and in good repair, allow 2 points; for fair condition, 1; poor, 0.

Protection of Product: If product is iced, allow 3 points; well protected but not iced, 1; no protection, 0.

Cleanliness: If perfectly clean, allow 5; good, 3; fair, 2; poor, 0.





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