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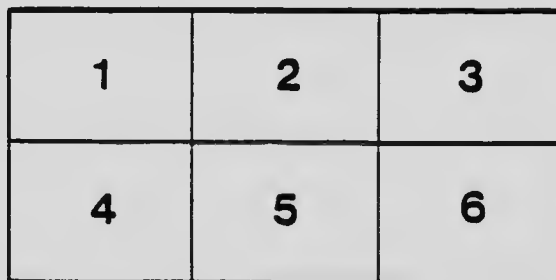
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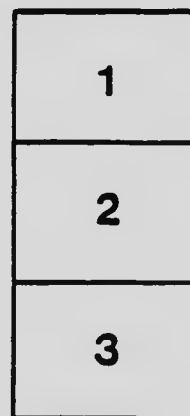
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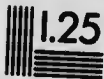
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# Ontario Department of Agriculture

ONTARIO AGRICULTURAL COLLEGE

BULLETIN 275

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## Farm Management

### Part I

## The Dairy Farming Business in Western Ontario

(SECOND SURVEY)

By

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and

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Department of Farm Management



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TORONTO, ONTARIO, JANUARY, 1920



# Ontario Department of Agriculture

## ONTARIO AGRICULTURAL COLLEGE

### FARM MANAGEMENT—PART I

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# The Dairy Farming Business in Western Ontario

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## SECOND SURVEY

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For the year ending February 28th, 1919

In the spring of 1918 the first business survey of the dairying district of Oxford County was made. At that time records were taken of the business transactions of 437 farms, for the year ending February 28th, 1918. The tabulations made and conclusions drawn from those records were published in pamphlet form, by this department, in the early spring of 1919. But owing to the varying conditions of weather, which so greatly affect the farming business, no one year's record may be taken as a truly *average* representation of that business. The *average* can be obtained only by taking yearly records from the same farms for a number of years, and then averaging the total data obtained. With this end in view, a second survey of Oxford County was made in the spring of 1919. In this second survey 351 records were taken, all but a very few of which were from farms which had given records the previous year. It is not the intention to make a comparative or average study until more than two surveys have been made. This bulletin is written to set forth only the findings of the second survey—of dairy farm business conditions in Western Ontario during the twelve-month period ending February 28th, 1919.

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## FINDINGS OF THE SECOND SURVEY.

On completion of the analysis of the data collected, the following conclusions were reached:—

1. That while the Labor Income from the average large farm is higher than that from the average small farm, it is possible, by employing better farming methods, to raise the Labor Income from the small farms considerably above the average. (See Table 1.)

2. That for dairying purposes, farms of 61-75 tillable acres, and 111-135 tillable acres, are "odd-size farms," which to produce maximum profits require greater managerial ability on the part of the operator than do farms of any other size. (See Table 1.)



3. That the Labor Income advances steadily with increased crop yields per acre, if all other factors remain constant. (See Table 2.)

4. That quality of live stock—or the producing capacity of the milch cow—is the greatest single factor in determining profit or loss in the dairy farming business. The dairy cow is the "commission house," through which the dairyman markets his produce. His profit depends upon how cheaply his produce is handled. (See Tables 3 and 4.)

5. That the use of a grade or scrub sire cannot be tolerated by the progressive dairyman. (See Table 5.)

6. That all-year dairying—or winter dairying—has proven a most profitable feature of farm organization in Oxford County. (See Table 6.)

7. That the *average* man should not specialize in dairying to a greater degree than the receiving of 70% of his gross revenue from the dairy herd. The most profitable degree of specialization depends largely upon individual conditions, but certain side-lines work naturally into the business. (See Table 7.)

8. That the majority of farmers in Oxford County may add to their profits by maintaining larger herds of milch cows on their present acreages. (See Table 8.)

9. That rigid economy in operating expenses is not the *only* key to success in dairy farming, unless the quality of live stock be poor. Farming still pays a premium for hard manual labor, but the farmer with good stock may secure greater profit with less work by making a liberal expenditure for labor and feed. (See Table 9.)

10. That despite the increased prices of farm products during the ~~past~~ few years, six per cent. of the farmers in the surveyed area of Oxford County had Labor Incomes of less than nothing, for the year ending February 28th, 1919. (See Table 10.)

11. That the average cost of production of milk on 139 Oxford County farms, during the year ending February 28th, 1919, was \$2.64 per cwt., and that during the same period and on the same farms the average selling price was \$2.36 per cwt. (See Table 11.)

12. That high milk yield per cow is the greatest single factor tending to reduce cost of production. (See Table 12.)

13. That breeding is a slower but much more profitable method of increasing milk yield per cow (and hence reducing cost of production) than is feeding. (See Table 13.)

14. That there is a danger of feeding beyond the producing capacity of cows even though they be of good breeding. (See Table 14.)

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#### METHOD OF COLLECTING DATA.

The same method of collecting data was used in this second survey as was employed in the original survey in 1918. Men were sent to the individual farms to get detailed accounts of all business transactions from March 1st, 1918, to February 28th, 1919. Special forms were used, which enabled these enumerators to ask questions in a logical manner and thereby assist the farmer's memory, regarding the minor details of his business. The large items he could remember without assistance, even though he kept no books.

Record was made of the following items:—

1. The number of acres under each crop grown, and in pasture, waste, or woodlot.
2. The yields of the various crops, and the amount of each sold during the year.
3. The amount of feed on hand at the beginning and end of the year, and the amount purchased during the year.
4. The numbers and values of each kind of live stock, at the beginning and end of the year, together with purchases, sales and deaths of animals within the year.
5. Receipts from all live stock products—milk, eggs, wool, hides, etc.
6. An itemized account of current expenses:—taxes, labor, repairs to buildings and machinery, threshing, silo-filling, binder twine and all minor expenses.
7. Valuation of buildings and machinery, with an estimate of the future life of each building and machine.
8. Valuation of the farm itself, in order to arrive at the total amount of capital invested in the business.

### LABOR INCOME.

The Labor Income is the basis upon which the comparison of different farms is made. It is the measure of profit or loss on the farm business for the year. To permit of a clearer understanding of what the term implies, a brief outline of the method employed to calculate the Labor Income is given below:—

1. All farm receipts for the year are totalled:—crops sold, live stock and stock products sold, increase in value of young stock, miscellaneous.
2. All expenses for the year are totalled:—current expenses as outlined in a preceding paragraph, depreciation on buildings and machinery.

NOTES:—In "current expenses," a charge is made for labor performed by members of the family who work for no stated wages. The farmer is asked to estimate the amount he would have to pay out if he had to hire men to do the work which is done by his family. This places the farmer with no family on an equal labor basis with the man who has a large family.

In calculating the total receipts and total expenses, due allowance is made for any increase or decrease in the value of mature live stock, for stock purchased, and for any difference in the amounts of feed on hand at the beginning and end of the year.

3. From the total receipts is deducted the amount of total expenses, and the balance is the farmer's net revenue for the year—the earnings of both his labor and his capital invested.

4. Interest at 5 per cent. on the total capital invested is calculated and deducted from the amount of net revenue. This leaves only the amount earned by the farmer's labor and managing ability—which amount is termed *Labor Income*.

If then the "net revenue" of a farm (as defined in clause 3 above) does not amount to as much as 5 per cent. on the capital invested, that farmer is said to have a "minus" Labor Income—that is, he has worked for less than nothing for the capital would have brought in at least 5 per cent. in any secure investment with absolutely no labor on the part of the farmer. On the other hand, if the "net revenue" of the farm is several hundreds, or thousands, of dollars greater than 5 per cent. interest on capital, that difference is caused by the successful work and good business management of the farmer. A comparison of the methods employed

by the farmers having low Labor Incomes with the methods of farmers having high Labor Incomes is set forth in the following pages.

The question is sometimes asked, "How does the farmer who has a low or 'minus' Labor Income manage to live throughout the year?" If that farmer had to pay out actual cash for the interest on his total investment, the depreciation on his buildings and machinery and for the labor performed by his family, he could not continue in the farming business. But in many cases of low Labor Income there is only a small mortgage, or none at all, on the property, and often much of the extra labor is performed by the farmer's wife and children. Depreciation on buildings and machinery is charged each year to form a reserve fund to replace those buildings and machines at the conclusion of their period of usefulness; but neither is this an actual cash payment during the year. These charges for interest, family labor, and depreciation, not being actually paid out as such, can be used for the necessary personal expenses of the farmer and his family. But they cannot in any way be included as part of the farm profit for the year. The farm profit or Labor Income is the surplus after these legitimate charges have been made. This places the young farmer, whose farm may be heavily mortgaged and whose children are not old enough to help with the work, on the same basis as his older and better established neighbor. The man whose Labor Income is low or minus, year after year, will eventually be forced out of business, for he will be unable to make the necessary replacements of buildings and equipment, which, in time, will be required.

#### EXPLANATION OF OTHER TERMS.

*Animal Unit.*—A mature cow kept on the farm for twelve months is termed *one animal unit or live stock unit*. A mature cow kept only six months is one-half unit. Other animals are fractions of units, based on the relative amounts of feed consumed, and the number of months kept. Hence, a farm having twenty animal units has sufficient live stock to consume the same amount of feed that twenty mature cows would use in twelve months.

*Live Stock Index.*—The gross receipts per animal unit on each farm is calculated. Then the average receipts per animal unit for the whole area is found. The farm showing receipts per animal unit exactly the same as the average figure for the area has a Live Stock Index of 100. Likewise farms with receipts per animal unit 10 per cent. above or 10 per cent. below the average figure have, respectively, Live Stock Indexes of 110 or 90.

*Crop Index.*—As the live stock index is a measure of efficiency in live stock production, so is the crop index a measure of efficiency in crop production. The average yield per acre of each crop in the district is determined. The yields per acre of the crops on each farm are compared with these district averages. The farm which has crop yields just equal to the district averages has a Crop Index of 100. Crop yields 10 per cent. above the average give a Crop Index of 110, while crop yields 10 per cent. below the average give a Crop Index of 90.

*Tillable Area.*—The rough pasture land and pastured woods add to the feed producing capacity of the farm, and hence must be taken into consideration. It is estimated that three acres of rough land or ten acres of woods pastured will produce the same amount of pasture as one acre of tillable land. Hence, to the actual number of tillable acres on each farm is added one-third of the number of acres of rough pasture and one-tenth of the number of acres of pastured woods.

The new figure so obtained is taken as the *Tillable Area* of the farm, and is used as the basis in grouping farms according to size.

*Acres per Cow.*—In calculating the number of acres per cow, the number of *Tillable Acres* (as explained above) was divided by the number of milch cows. Young stock were not considered.

### INFLUENCE OF SIZE OF FARM ON LABOR INCOME.

TABLE I.

Size—Tillable Acres.	21-45 ac.	46-60 ac.	61-75 ac.	76-90 ac.	91-110 ac.	111- 135 ac.	136- 160 ac.	161- 185 ac.	over 185 ac.
No. of Farms .....	21	38	49	77	72	36	23	10	10
Average Actual Acres .....	48	61	51	104	114	147	179	201	263
Average Tillable Area .....	39	57	70	83	98	123	145	168	214
Average Crop Acres .....	32	2	2	62	68	88	98	102	143
Average Total Capital .....	\$7576	\$9421	\$1238	\$14338	\$15568	\$19263	\$21241	\$24265	\$36186
Average Capital in Real Estate.	\$5143	\$3277	\$560	\$483	\$10287	\$12849	\$14291	\$16010	\$24200
Average % Cap. in Real Estate.	68	66	37	69	66	67	67	66	67
Average Capital in Buildings.	\$2714	\$2861	\$3521	\$3922	\$4065	\$4637	\$4832	\$5655	\$8635
Average % Cap. in Buildings.	36	30	27	27	26	24	23	23	24
Average Capital in Machinery.	\$568	\$651	\$848	\$1003	\$984	\$1215	\$1176	\$1282	\$1948
Average % Cap. in Machinery.	7.5	6.9	6.8	7.0	6.3	6.3	5.5	5.3	5.4
Average Cap. in Live Stock ...	\$1549	\$2087	\$2795	\$3101	\$4436	\$4175	\$676	\$5488	\$7914
Average % Cap. in Live Stock.	20.4	22	21.5	21.6	22	21.7	22	22.6	21.8
Average Capital in Feed .....	\$314	\$521	\$596	\$745	\$852	\$959	\$1248	\$155	\$2054
Average Crop Acres per man...	28	30	28	33	36	36	40	44	44
Average Crop Acres per horse...	13	15	14	14	15	18	17	18	18
Average Live Stock Index .....	108	108	93	100	101	99	91	95	92
Average Crop Index .....	100	102	96	101	101	96	100	96	107
Average Crops Sold .....	\$98	\$154	\$126	\$222	\$261	\$463	\$536	\$451	\$1950
Average Value Milk per cow ...	\$120	\$124	\$104	\$109	\$113	\$105	\$94	\$110	\$105
Average feed bought .....	\$179	\$172	\$232	\$288	\$290	\$305	\$347	\$449	\$141
Av. Depreciation Bldgs. & Mach.	\$159	\$187	\$231	\$275	\$274	\$308	\$391	\$360	\$622
Average Labor—Hired .....	\$84	\$184	\$352	\$415	\$400	\$670	\$666	\$607	\$1094
Gross Receipts .....	\$1835	\$2362	\$2784	\$3397	\$3662	\$4424	\$4970	\$5755	\$7486
Average Total Current Ex. ....	\$559	\$734	\$1029	\$1217	\$1204	\$1631	\$1697	\$1842	\$2251
<b>AVERAGE LABOR INCOME.</b>	<b>\$735</b>	<b>\$936</b>	<b>\$868</b>	<b>\$1158</b>	<b>\$1327</b>	<b>\$1440</b>	<b>\$1881</b>	<b>\$2159</b>	<b>\$2449</b>
	10	10	10	10	10	10	8	5	5
Av. Labor Income on Best Farms	\$1236	\$1804	\$1975	\$2695	\$2772	\$2695	\$2769	\$3192	\$3691

As in the report on the first survey of Oxford County, Table I of this report shows that the larger Labor Incomes are made on the larger farms. This fact is due, of course, to the larger volume of business which the larger farm makes possible, and to the better use which is usually made of man labor and horse labor on the larger farm. In order that the main comparative points may be studied with greater ease, a smaller table (Table I A), comprising these points only, has been prepared.

Little comment is necessary on this table, except to point to the greater proportion of non-productive capital (buildings and machinery) on the smaller farms. 43.5 per cent. in the 21-45 acre group as compared with 29.4 per cent. in the group of largest farms. The greater the proportion of non-productive capital, the greater is the overhead expense which must be overcome. It may be seen also that man and horse labor on crops was used to considerably better advantage on the large farms than on the small. The Crop Index does not vary

greatly, all groups being approximately average in this respect. On the large farms, it is impossible to give the live stock the same attention as on the small, consequently the live Stock Index is lower. But this lowering of receipts per animal unit is more than made up in volume of business.

TABLE 1A.

Size (Tillable acres)	21 to 45	46 to 60	61 to 75	76 to 90	91 to 110	111 to 135	136 to 160	161 to 185	over 185
Total Capital .....	\$7576	\$9463	\$12538	\$14338	\$15568	\$19203	\$21241	\$24265	\$36186
Per cent. Cap. in Bldgs. ....	36	30	27	27	26	24	23	23	24
Per cent. Cap. in Mach'y. ....	7.5	6.9	6.8	7.0	6.3	6.3	5.5	5.3	5.4
Per cent. Cap. in L. Stock ....	20	22	22	22	22	22	22	23	22
Crop ac. per man .....	28	30	28	33	36	36	40	44	44
Crop ac. per horse .....	13	15	14	14	15	18	17	18	18
Live Stock Index .....	108	108	93	100	101	99	91	95	92
Crop Index .....	100	102	96	101	101	96	100	96	107
Gross Receipts .....	\$1835	\$2362	\$2784	\$3397	\$3662	\$4424	\$4970	\$5755	\$7486
Labor Hired .....	\$84	\$184	\$352	\$415	\$400	\$670	\$666	\$607	\$1094
Labor Income .....	\$735	\$936	\$868	\$1158	\$1327	\$1440	\$1881	\$2159	\$2449
	10	10	10	10	10	10	8	5	5
Labor Income on Best Farms	\$1236	\$1804	\$1975	\$2695	\$2772	\$2695	\$2769	\$3192	\$3691

There are two seeming irregularities in Table 1 (or 1 A). The average labor income of the 61-75 acre group is slightly smaller than the average of the 16-60 acre group. Likewise, the average labor income of the 111-135 acre group is but very slightly larger than the average of the 91-110 acre group. A similar effect may be noticed in the labor incomes of the ten best farms in these groups. The increase over the previous group is not as great as increase in size of farm would seem to warrant. This same result was found in the first survey of Oxford, and in the first survey of Dundas County to a slighter extent. The explanation of this seeming peculiarity lies in the fact that for dairying purposes, the 61-75 acre and 111-135 acre farms are what might be termed "odd-size farms." The nine groups of farms in Table 1 split naturally into three divisions:--

1.
 

}	21 to 45 Tillable Acres.
	46 to 60 Tillable Acres.
	61 to 75 Tillable Acres.
2.
 

}	76 to 90 Tillable Acres.
	91 to 110 Tillable Acres.
	111 to 135 Tillable Acres.
3.
 

}	136 to 160 Tillable Acres.
	160 to 185 Tillable Acres.
	Over 185 Tillable Acres.

The 61-75 acre farm is slightly too large to be handled successfully by one man, but is still too small to permit of an organization that will efficiently employ

two men's labor. The operator of a farm of this size, therefore, usually tries to worry along by himself or else is forced to employ the unsatisfactory transient or "floating" labor. In consequence, we find that in both live stock and crop production this group of farms is below the district average. Practically the same features are found in the 111-135 acre farms. They are too large for two men but too small to keep three men profitably employed. They employed as much labor as did the next larger group, but their gross receipts were \$516 per farm less.

To operate one of these "odd-size" farms at maximum profit requires greater managerial ability than to operate a farm of any other size. The most successful methods of farm practice in Oxford County, as explained further on in this bulletin, should be given very careful study, and their application to individual conditions made wherever possible. It will be remembered, of course, that the division of farms was based on the "tillable area" which has already been explained. To get back to the actual number of acres in these farms, one must refer again to Table 1. It shows that the farms of 61-75 tillable acres are really 91 acres in extent, while the 111-135 acre group average in size 147 actual acres.

Although it has always been conceded by the majority of men that the larger farm will yield more profit than the smaller, it has not been, and is not now, possible for all men to acquire large acreages. Those who have the smaller farms must strive, therefore, to overcome this deficiency by a better organization of their business as it stands; they must evolve a system of farm operations which will utilize labor to best advantage; they must carry more live stock per acre of land, and they must use the utmost discretion in the breeding and feeding of that live stock. In short, the smaller the acreage, the more intensive must be the type of farming in order to secure maximum profits. Table 1 (or Table 1 A) shows that certain farmers in Oxford County are working to better advantage than their neighbors, despite the handicap of small acreage. The ten best farmers having 21-45 tillable acres made an average labor income of \$1,236, which is more than the average farmer on the 76-90 acre farm. Likewise the ten best farmers on the 76-90 acres of tillable land, which is the average 100-acre farm, (see note on "Tillable Area") made an average labor income of \$2,695, which is \$246 more than the average of the ten farms over 185 acres in extent. Some of the more potent factors of success in the dairy farming business are presented below.

## INFLUENCE OF CROP YIELDS ON LABOR INCOME.

TABLE 2.

Crop Yields*	No. of Farms	Labor Income	Labor Hired per Farm	Crop Ac. per Man	Crop Ac. per Horse
Under 81% of average.....	30	\$ 624	\$ 297	34	14
81-90 % of average.....	65	1148	406	36	15
91-100 % of average.....	81	1173	431	33	15
101-110 % of average.....	81	1435	461	33	15
Over 110 % of average.....	71	1510	452	32	15

\*Crop yields are based on Crop Index as explained previously in this bulletin.

The first logical step toward increase in farm profits lies in improved cultural methods, and thereby increased crop yields per acre. Table 2 shows that the 71 farmers in Oxford County who had crop yields of more than ten per cent. above the average made average labor incomes more than twice as great as those having crop yields twenty per cent. or more below the average. The advance in labor income in the intermediate groups is in accord with the increase in crop yields. There was very little difference in the crop acres worked by each man and each horse, in the different groups, and with the exception of the very low group, practically the same amount of labor was employed. So, while it is not within the scope of this bulletin to discuss cultural methods, it can be stated with certainty that the man who is furthest on the road to success is the man who studies the latest scientific data on cultivation of the soil, drainage, fertilizers, weeds and plant diseases and who makes the most practical application of the knowledge so gained, to the conditions peculiar to his own farm.

The average yields of the main crops grown on 351 farms in Oxford County, in 1918, were:—

Hay .....	1.9 tons per acre.	Mixed Grain .....	50 bus. per acre.
Oats .....	52 bus. per acre.	Silage Corn .....	8.8 tons per acre.
Barley .....	43 bus. per acre.		

### GOOD LIVE STOCK AND LABOR INCOME.

TABLE 3.

Quality of Live Stock*	No. of Farms	Labor Income	Feed Bought	Labor Hired Per Farm
Under 71% of average.....	35	\$ 14	\$206	\$425
71-80% .....	34	761	140	354
81-90% .....	48	948	231	425
91-100% .....	61	1310	233	446
101-110% .....	51	1498	266	417
111-120% .....	32	1610	296	368
121-130% .....	27	1872	338	549
Over 130% of average .....	40	2047	422	433

\*Quality of live stock is based on Live Stock Index, as explained previously in this bulletin.

In an essentially live stock district, the greatest single factor of profit or loss in the farming business is the quality of live stock. Poor live stock, or good live stock poorly handled, were never known to show a balance on the proper side of the ledger. Table 3 was prepared to show just how great an influence this factor does exert. The farms were grouped according to Live Stock Index, which, as previously explained, shows the percentage of receipts per "animal unit" above or below the average for the district. The average receipts per animal unit in the surveyed area in Oxford County, from March 1, 1918, to February 28, 1919, was \$118. 71 per cent. of \$118 is \$84. Hence each of the 35 farmers in the first group in the table realized less than \$84 per animal unit from their live stock. Likewise each of the 40 farmers in the last or high group received more than \$153, or 130 per cent. of \$118, per animal unit. The intermediate farms were arranged in percentage groups as shown. The labor income column of the table shows a steady increase as the quality of stock improves—or as the receipts per animal unit increase. More feed was required for the more highly productive

stock, as shown by the "feed bought" column, but it was considerably more than repaid. There was very little difference in the amount of labor required.

Although not shown in the table, it is interesting to note that each of the four groups below 100 per cent. (or average) in receipts per animal unit, contained two or more farms having "minus" labor incomes, whereas no "minus" labor incomes appeared in the four groups above the 100 per cent.

In a dairying district such as Oxford County, "quality of Live Stock" may be interpreted as "quality of milch cows." Hence the farmer, who wishes to increase his labor income most quickly and surely, must give strict attention and considerable thought to the breeding and feeding of his herd, for milk production.

#### COMPARATIVE EFFECTS OF GOOD CROPS AND GOOD LIVE STOCK ON AMOUNT OF LABOR INCOME.

TABLE 4.

Farms With	Poor Live Stock	Medium Live Stock	Good Live Stock
Poor Crops.....	No. of farms—39 Labor Income \$449	No. of farms—36 Labor income \$1335	No. of farms—20 Labor income \$1398
Medium Crops.....	No. of farms—68 Labor income \$674	No. of farms—50 Labor income \$1398	No. of farms—54 Labor income \$1909
Good Crops.....	No. of farms—20 Labor income \$786	No. of farms—26 Labor income \$1473	No. of farms—25 Labor income \$2134

In studying Tables 2 and 3, it has been seen that both crop yields and receipts per unit of live stock exert an influence on the farm profit or Labor Income. Table 4 was prepared to determine which of these two influences was the greater. The farms were divided first into three groups—according to whether their crop yields were "poor," "medium" or "good." Then each of these three groups was divided into three smaller groups—according to whether the live stock was poor, medium or good. This gave nine groups, as shown:

39 farms with Poor Crops and Poor Stock	54 farms with Med. Crops and Good Stock
36 " " " " Medium "	20 " " Good " Poor "
20 " " " " Good "	26 " " " " Medium "
68 " " Medium " Poor "	25 " " " " Good "
50 " " " " Medium "	

The groups are arranged in the table in such a manner that a comparison of the influences of crop yields and stock returns is very simple. To discover the benefit of good crops over poor crops, one must compare the three groups in each of the vertical columns. For example, take the column headed "Poor Live Stock." The quality of stock is exactly the same in each of the three groups in this column. Therefore, the rise of \$337 (from \$449 to \$786) in Labor Income must be due to the increased yield per acre of the farm crops. In the next vertical column, where the stock are of the same quality in each of the three groups (although better than in the preceding vertical column), there is an increase in Labor Income of \$148, due to the influence of good crops. In the third vertical group or "Good Live Stock" farms, the increase due to crops is \$736.



Then to determine the influence of quality of live stock, where the crop yield remains constant, one must study each horizontal column within itself. For example, take the first horizontal column, which is headed "Poor Crops." All the farms in this column had low crop yields, but thirty-nine had poor live stock, thirty-six medium live stock and twenty good live stock. The advance of \$949 in Labor Income (from \$449 to \$1,398) was due, therefore, to higher receipts per animal unit. In the second horizontal column, all the farms had medium crop yields, but those who had good stock made \$1,235 more than those who had poor stock. Likewise in the "Good Crop" column, quality of live stock was responsible for an increase of \$1,318 (from \$786 to \$2,134) in Labor Income.

On making these comparisons, it will be noted that the increase due to improved live stock is very much greater than that due to increased crop yields. Again, compare the first vertical column with the top horizontal column. Each of these columns begins with the same group, that with poor crops and poor stock. Now where the stock remains constant and the crop yields increase, the Labor Income rises from \$449 to \$786, but where the crops remain constant and quality of live stock increases, the Labor Income jumps from the same figure (\$449) to \$1,398. The conclusion must be reached, therefore, that quality of live stock is a more potent factor in determining farm profit than is yield per acre of farm crops. This does not mean that cultivation, drainage, crop rotation, control of plant diseases, etc., are things which can be neglected, but it does mean that a dairyman may have crop yields far above average and yet show a loss on the year's business because his crops were fed to cows which were incapable of producing milk profitably. The dairy herd is the dairyman's market for his grain, hay, silage and roots. If that market be unprofitable, the more he sells through it the greater is the loss he sustains.

### THE PURE-BRED HERD SIRE.

TABLE 5.

	No. of farms	Labor Income	Milk sold per cow	Feed per cow	Profit over feed
Grade Sire.....	131	\$ 961	\$ 94	\$76	\$18
Pure-Bred Sire, 5 years or less .....	49	1248	117	81	36
Pure-Bred Sire, 5-10 years .....	46	1473	115	81	34
Pure-Bred Sire, over 10 years .....	74	1710	137	86	51

Tables 3 and 4 have shown the value of quality of live stock in increasing the Labor Income from the dairy farm. By "quality" is meant, of course, the ability to produce milk at a profit. As every dairyman knows, the first step in grading up a herd for milk production is the use of a pure-bred bull from a high-producing dairy strain. Improvement by breeding is, naturally, a slow process, but it is the only course open to the man who is not financially able to purchase an entire herd of high producers. Table 5 shows the ultimate result of improvement by breeding. The profit over feed from the highly graded herd is almost three times as great as that from the herd headed by the grade or scrub sire, while the Labor Income is almost twice as great. A most striking sidelight brought out in this table is the large number of grade sires still in use. Of the 300 farms

used in the tabulation, 131, or 43.6 per cent., used grade sires during 1918. The same amount of labor and very nearly as much feed was required for these poor quality herds as for the graded-up herds, but the net profits were much lower. The farmer who depends upon his cows for more than half of his farm income has no place for the scrub sire. Aside from the direct benefit of having the blood of a high-producing strain in his herd, there is a secondary effect upon the farmer himself, when he sells his grade sire and buys a pure-bred. The man who uses a pure-bred sire takes more individual interest in his cows and general care of his herd than does the careless breeder. This is undoubtedly the reason for such a marked advance in milk sales per cow, with only five years or less of grading up, for breeding cannot show much general effect upon the milking herd in less than five years.

### POSSIBILITIES OF ALL-YEAR DAIRYING.

TABLE 6.

	No. of Farms	Labor Income	Milk Sold per Cow	Feed per Cow	Profit over Feed
Summer Dairymen— Those selling more than 2-3 of year's milk in summer months—April 1 to Sept. 30.....	164	\$1111	\$101	\$77	\$24
Winter Dairymen— Those selling more than 1-3 but less than 1-2 of year's milk in winter months—October 1 to March 31.....	102	1385	121	85	36
Strictly Winter Dairymen— Those selling more than 1-2 of year's milk in winter months—Oct. 1 to March 31.....	34	1722	132	84	48

All-year dairying, or winter dairying as it is more commonly called, has proven a most profitable feature of successful farm organization in Oxford County. From exactly 300 farms a detailed statement of monthly milk sales was obtained. This permitted of a separation of summer dairying farms from those selling a large percentage of milk during the winter months. Table 6 gives the results of the year's operations on these different types of farms. One hundred and sixty-four out of the 300 were found to sell more than 60 per cent., or two-thirds, of the year's supply of milk during the summer months—April, May, June, July, August and September. The other 136 sold more than 40 per cent., or one-third, of the year's milk during the winter months—October, November, December, January, February and March—and hence may be classed as "winter dairymen." For the purpose of further comparison, the winter dairymen were divided into two groups. Thirty-four out of the 136 sold more than half of the year's milk during the winter months, so they were grouped by themselves and termed "Strictly Winter Dairymen." A glance at the table shows a steady increase in Labor Income with the increase in proportion of milk sold during the winter. More feed per cow is required to produce winter milk, but the price received more than makes up for this

extra cost of production. There is also another factor which has an important bearing on winter dairying. The cow which freshens in the Fall is in the natural flush of milk during the winter months. In the Spring, the stimulus of fresh grass keeps up a strong flow of milk, with the result that this cow gives more milk during the year than does the cow which freshens in the Spring. In the latter case the cow is nearing the end of her lactation period when winter feeding commences, and it is both difficult and costly to keep up her milk flow under these combined disadvantages. Oxford County is favorably situated for the production of winter milk in that it has several markets close at hand, which can utilize the entire supply. Oxford County dairymen, therefore, who have not already done so, would do well to look into this phase of the business as a means of increasing their yearly profits.

### SPECIALIZATION—DOES IT PAY?

TABLE 7.

Percentage of Total Farm Receipts from Dairy Herd	No. of Farms	Labor Income	Milk Sold per Cow	Labor Hired per Farm	Feed Bought per Farm
Below 51%.....	43	\$ 861	\$ 79	\$408	\$217
51-60%.....	55	1384	99	445	269
61-70%.....	65	1485	108	465	274
71-80%.....	79	1285	117	394	276
81-90%.....	47	1335	124	442	233
91-100%.....	38	986	134	409	304

"To what extent does it pay to specialize in dairying?" "Should I spend all my energy in producing milk, or spread out my business to include some cash crops, hogs, poultry, etc?" Such questions are being asked by practical dairymen every day. Some men who sell practically nothing but milk from their farms are apparently prosperous. Others who seem to sell a little of everything are apparently equally prosperous. Table 7 was prepared to show the comparative results from different degrees of specialization in Oxford County. The first group of forty-three farms received less than half of their gross income from the dairy herd (including both the milk sales and sales of young stock). The operators of these farms might be classified as "mixed farmers" rather than as "dairymen." The second group of fifty-five farms received from 51-60 per cent. of their gross income from the dairy herd. The degree of specialization increases throughout the table, until the last group is composed of thirty-eight farms which sold practically nothing but milk and dairy live stock—dairy specialists in the strictest sense. A glance down the "Labor Income" column shows that the best results were obtained by those men who received between 60 and 70 per cent. of their income from their dairy cattle and between 30 and 40 per cent. from cash crops, hogs, colts and poultry. In other words, they were dairymen carrying profitable side lines, or it might be said that they were "two-thirds dairyman and one-third mixed farmer." However, the variation in Labor Income, in the four centre groups of the table, is so small that no absolutely definite degree of specialization can be set down as

being the most profitable. The extent of specialization most profitable will depend largely upon the location of the farm, its distance from the milk market and the nature of that market. The man who sells milk to a cheese factory and gets his daily supply of whey can certainly raise more hogs and raise them more cheaply than can the man who sells whole milk. A farmer whose land is particularly adapted to the growing of some cash crop (such as wheat, clover seed, or sugar beets), and is close to a shipping point, may find it profitable to grow a limited acreage of this crop and buy a little more feed for his cows. The individual ability of the farmer himself must be considered. Some men cannot get high yields from dairy cows as profitably as can others, and high yields are essential to profitable specialization. But Table 7 does show two things conclusively: first, that the average man must receive at least half of his gross income from the dairy herd, and second, that he must not go to the other extreme and neglect all side lines. The group of "strict specialists" made almost as low an average Labor Income as did the group of "mixed farmers." And in consideration of the fact that the 61-70 per cent. specialization group made \$150 more Labor Income than any other group of higher specialization, it may be said that this is the safest and best organization for the *average* man.

But the argument is advanced that there are, in Oxford County, some very successful dairymen, who specialize to a much higher degree than 70 per cent. Quite so; there are some who specialize to a greater degree than 80 per cent., and do it extremely successfully. But, as stated just above, these men are born dairy specialists. The twenty farms with the highest Labor Incomes were picked from the last two groups in the table (over 80 per cent. specialization), and a partial analysis of their business is shown below in Table 7A.

TABLE 7A.—FARMS WITH HIGHEST LABOR INCOMES—OVER 80 PER CENT. SPECIALIZATION.

No. of Farms	Average Degree of Specialization	Labor Income	Milk Sold per Cow	Labor Hired per Farm	Feed Bought per Farm	Herd Average Milk	No. of Cows per 100 acres
20	88%	\$2596	\$145	\$606	\$450	6100 pounds	18

That the operators of the farms were successful is proven beyond all doubt. Their Labor Incomes averaged \$2,596. They secured from their cows an average milk yield of 6,100 pounds, which they sold for \$145. They were heavily stocked, having eighteen milch cows to the 100 acres (actual), besides the young stock necessary to maintain their herds. But these men, though successful specialists, did not eliminate all side lines. They specialized up to 88 per cent. of their total business, but 12 per cent. of their revenue came from sources other than the dairy herd—cash crops, hogs, colts, poultry, etc. In dairying, as in any other business, specialization offers opportunity for great success, but at the same time offers as great opportunity for unqualified failure. There were eighty-five farms in the two groups over 80 per cent. specialization, having an average Labor Income

of \$1,186. Twenty of these farms averaged \$2,596 in Labor Income. Consequently, there must have been as many with very low Labor Incomes to bring the average down to \$1,186. The dairyman must decide for himself, therefore, whether his own natural ability will allow him to enter the realm of the specialist, with its opportunities and at the same time its hazards, or whether he is better off on the surer footing of average ground, where his chances of great success are fewer, but where he is sure of being at least fairly comfortable.

#### NUMBER OF ACRES PER MILCH COW FOR GREATEST PROFIT.

TABLE 8.

Tillable Acres per Milch Cow	No. of Farms	Labor Income	Milk Sales per Cow	Labor Hired per Farm	Feed Bought per Farm
4 or less (Average 3.8)	31	\$1790	\$116	\$400	\$313
4.1—5.0	72	1438	121	441	375
5.1—6.0	79	1413	114	386	249
6.1—7.0	63	1183	113	442	229
7.1—8.0	27	935	97	527	240
Over 8.0 (Average 9.9)	33	780	97	287	127

The young man who is just commencing to farm, or even the older and established dairyman, should ask the question, "How many cows can I keep profitably on 100 acres"—or 50 or 150 acres, as the case may be. Heretofore, no definite attempt has been made to secure a proper answer to this question. Table 8 was compiled for the purpose of finding out whether or not the dairymen of Oxford County were stocking their farms too heavily or not. On each of 305 farms, the number of acres in the "Tillable Area" (see explanation near beginning of bulletin) was divided by the number of cows milked during the year. This gave the number of tillable acres per milch cow. On the 305 farms, the number of tillable acres per cow varied from less than three to more than fifteen. On the larger proportion, however, the variation was from four to seven. This figure represents acres per milch cow only. Young stock necessary to maintain the herd were not included in the calculation. The farms were then grouped, according to tillable acres per cow, into six groups, as shown in the table. A glance at the Labor Income column shows that the farmers of Oxford are not yet stocking too heavily for profit. The most heavily stocked group of 31 farms made more than twice the average Labor Income made by the most lightly stocked group of 33. The other groups varied in Labor Income in direct accord with the rate of stocking. The quality of cows, as evidenced by the "Milk Sales per Cow" column, did not vary greatly except in the last two groups. It was not surprising to find these two groups low in quality of cows; farmers who have a few cows as these are not usually good dairymen in any sense. As would be expected, the highly stocked farms were forced to buy more feed, but this extra expenditure was well repaid. Labor charges did not vary greatly except in the last group, in which they were low. It may be said, therefore, that an increased rate of stocking with milch cows will do much to increase the average farmer's Labor Income.

The conclusion drawn from Table 8 must not be confused with the conclusions drawn from Table 7. Heavy stocking with milch cows does not necessarily mean an increase in specialization. Fifteen of the thirty-one farms in the first group in Table 8 specialized to a degree of only 66 per cent., and made an average Labor Income of \$287 more than the other sixteen. This can be shown more clearly in table form. (See Table 8A)

TABLE 8A.—EFFECT OF TOO GREAT SPECIALIZATION ON 31 HIGHLY STOCKED FARMS.

No. of Farms	Degree of Specialization	Labor Income
16	91%	\$1647
15	66%	1934

These thirty-one farms are all stocked to practically the same extent, all having four acres or less per milch cow. As was pointed out in the discussion on Table 7A, the dairyman must decide upon his own degree of specialization, but the majority in Oxford County can increase the size of their businesses by keeping more cows.

To permit of a clearer understanding of what the number of tillable acres per cow really means in terms of cows per farm, the following calculation is given:

QUESTION.—At four tillable acres per cow, how many cows may be kept on the average 100-acre farm?

On looking back at Table 1, it is seen that the group of 76-90 Tillable Acres has an average actual size of 104 acres—practically the hundred-acre farm. The average tillable area of this group is 83 acres. At four tillable acres per cow this means approximately 21 cows per farm.

Similarly, the approximate number of cows per farm, on any size of farm and at any rate of stocking, may be calculated. To calculate the number of cows on a known farm at a given rate of stocking.

1. Add (a) the number of acres actually tillable, (b) one-third of the number of acres of rough pasture, and (c) one-tenth the number of acres of woods pastured.

2. Divide the total by the "number of tillable acres per cow" in question.

The figure obtained will be the number of milch cows for that farm at that rate of stocking.

## ECONOMY IN FARM EXPENSE.

TABLE 9.

Current Expenses	Farm Efficiency	No. of Farms	Labor Income	Live Stock Index	Crop Index	Labor Hired	Feed Bought	Crop Acres per Man	Animal Units per Farm
Low.....	Good	26	\$1522	98	100	\$214	\$ 76	38	21
	Poor	47	524	79	93	210	72	37	20
Low Medium.	Good	41	1835	108	103	303	161	34	25
	Poor	42	661	86	92	354	143	34	23
Average.....	Good	30	1997	111	102	330	285	35	31
	Poor	31	636	91	95	566	190	33	28
High Medium.	Good	28	2221	116	104	491	374	33	30
	Poor	20	636	99	100	594	298	32	23
High.....	Good	34	2221	129	110	635	608	30	31
	Poor	29	499	98	102	565	579	23	25

The claim is made by some farmers that success cannot be attained in the farming business except by dint of the most rigid economy in operating expenses. With a view to ascertaining the correctness of this contention, a tabulation was made from 328 farms of Oxford County. The results are shown in Table 9. The farms were divided into five groups as shown, according to the current expenses—low, low medium, average, high medium and high. Due allowance was made, of course, for size of farm. A large farm necessarily requires the expenditure of more money for running expenses than does a smaller farm. The farms were divided according to size as in Table 1. Then, if the current expenses of a farm were low, according to the average of the group to which it belonged, it was put in the "low" group for this tabulation. In similar manner all the groups were sorted out. This method put farms of all sizes in each group in Table No. 9 and caused the average size of each group to be practically the same. A subdivision of each group was then made, according to whether the labor incomes were above or below average. Those having a higher labor income than the average were termed "good," and those below average were termed "poor."

The contention that rigid economy is the only key to success was immediately disproven. Of the 73 farms in the low expense group, only 26 were above the average labor income. And on comparing the "good" farms of each group, it is seen that the labor income rises steadily with the increase of farm expenses. This is due to the fact that the added amount of labor and feed (which are the two chief variable items of current expense), caused a steady climb in returns from live stock and yield per acre of crops (Live Stock Index and Crop Index).

Nevertheless, farming does pay a premium for hard work and economy. The 26 "good" farmers in the low expense group, with returns from live stock two per cent. below the district average and crop yields exactly average, made an average labor income of \$1,522, whereas the average labor income of all 328 farms was \$1,248. These farmers must have had naturally productive live stock, for they could not have fed heavily, as they carried 21 animal units per farm and yet purchased only \$76 worth of extra feed. But these men worked 38 crop acres each, and with help for about four months only (as is indicated by the labor charge of \$214), cared for 21 units of live stock. The number of hours which they had for recreation and pleasure were not plentiful. On the other hand, the 34 "good" farmers of the high expense group worked only 30 crop acres each, but they employed labor by the year and purchased enough extra feed to keep 31 animal units each, which gave profitable employment for their hired labor during the winter months. Their net result, after paying for this extra labor and feed, was a labor income of \$2,221.

Of course, the quality of live stock is a great factor in determining whether or not extra expense for feed and labor is profitable. The 29 "poor" farmers of the high expense group paid out nearly the same amount for these items as did the "good" (and they kept only twenty-five animal units per farm instead of thirty-one), but their live stock still yielded them two per cent. less than the district average. On comparing the "poor" farms of the five groups it is seen that low medium or a little below average, is the best rate of expenditure. Either very low or very high expenditure results in low labor income. Poor quality of live stock on these farms was undoubtedly the cause of decreased profits with either a very low or very high expenditure for feed and labor. They were not naturally productive, and hence when fed lightly went down to 79 per cent. of average. When fed heavily, they were brought up to within two per cent. of average, but the extra feed and labor required to do this proved a very poor investment. The man who has poor stock, but yet must do the best with what he has, will find it most profitable to be just a little sparing with feed and labor, and to spend more of his energy on other branches of the business.

#### FARMS WITH "MINUS" LABOR INCOMES.

TABLE 10.

No. of Farms	Labor Income	Milk Sold per Cow	Live Stock Index	Crop Index	Table Acres per Cow
19	Minus \$512	\$78	64	91	6.9

In the 328 farms which were used for the greater number of tabulations, there were 19 farms from which the Labor Incomes were minus quantities. That is, there were nineteen farmers whose net revenue, after deducting running expenses and depreciation of buildings and machinery, did not amount to as much as 5 per cent. interest on the capital invested. As the capital would have earned that amount in bonds or mortgages, with no labor on the part of the farmer, it must be concluded that these men worked for less than nothing—or they had "minus" Labor Income. The reasons for this inefficiency of management varied considerably,



but a few outstanding features were common to all. These features are shown in Table 10. The Crop Index was 9 per cent. below the average, but this did not have as much effect on reducing the Labor Income as did the poor quality of cows. (See Live Stock Index of only 64 and milk sales of only \$78 per cow.) Their rate of stocking with milch cows was a little below the average of that district—6.9 tillable acres per cow—whereas the district average was 6. These nineteen farmers made Labor Incomes of “minus \$512”—or an average of \$512 less than 5 per cent. interest on their investments.

Table 10 is of value only as further proof that quality of live stock is the one big factor in determining profit or loss on the dairy farm. Other factors have their influence undoubtedly, but at the same time their influence is to a great extent controlled by the dominant factor—the quality of Live Stock.

#### GENERAL NOTES.

The average size of farm in the surveyed district of Oxford County is 113 acres.—actual size.

The average number of “Tillable Acres” per farm is 93. (See explanation of Tillable Area at front of this bulletin.)

The average number of Crop Acres per farm is 66.

The average Labor Income for the year ending February 28, 1919, was \$1,248.

The highest Labor Income in the district was \$5,134, and the lowest was “minus” \$1,065.

Six per cent. of the Labor Incomes were “minus.”

The average milk sales per cow on 300 farms was \$111.

The average amount of feed fed per cow on 300 farms was \$80.

The average number of cows per farm was 15.

The average total investment per farm was \$15,305.

The average real estate value was \$9,882, or \$87.50 per acre.

## The Cost of Production of Milk

Out of the 328 farms used in most of the general tabulations, only 139 could be used for the purpose of calculating cost of production of milk. Each of these 139 farms received more than 50 per cent. of its gross revenue from the sale of milk. The other 189 farms did not receive half of their income from milk sales alone, hence could not be considered as "milk producing" farms. The method employed in calculating the cost of production of milk required that each farm used be an essentially milk producing plant. This method differed in certain particulars from the method used in all other tabulations. For this purpose the farmer was allowed \$600 wages for the year, which amount was added to the current expenses for the year. An extra 2 per cent. interest on investment was allowed, making 7 per cent. altogether. As many lines of secure investment during the year 1918 offered as high as or higher than 7 per cent., this rate was considered fair in calculating cost of production. All sources of revenue, other than milk, were taken as "side lines," which would have the effect of lowering or raising the cost of the main product—milk—according to whether they, in themselves, were profitable or otherwise. This explains the necessity of rejecting all farms which had less than 50 per cent. income from milk alone.

A concrete example will explain better than description the details of the method:—

### FARM No. 266.

Size, 90 acres. Number of cows, 21.	Milk sold, 116,992 lbs. Total Capital, \$18,214.																																										
<i>Expenses.</i>	<i>Revenue from Sources Other Than Milk.</i>																																										
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Quite naturally there was, on 139 farms, a considerable amount of variation in the cost of production, depending upon the quality of live stock and upon the organization and management of the different farm businesses. Before going into a study of the direct causes of these variations, a table was prepared to show the amount of variation, and the relative number of cows per farm, where cost of production was low and where it was high.

## VARIATIONS IN COST OF PRODUCTION COMPARED WITH SIZE OF HERD.

TABLE 11.

Cost per cwt.	No. of Farms	No. Cows Per Farm	Average Cost Per Cwt.	Average Selling Price	*Labor Income
Below \$2.00 .....	47	20	\$1.68	\$2.34	\$1,797
\$2.00—\$2.50 .....	30	17	2.25	2.39	1,273
\$2.50—\$3.00 .....	26	17	2.68	2.46	973
Over \$3.00 .....	36	13	4.20	2.30	312

Average Cost of Production on 139 farms, \$2.64.

Average Selling Price on 139 farms, \$2.36.

\*Labor Income was calculated on the same basis as in all other tabulations.

Table 11 shows that 47 farmers out of 139 produced milk during the year 1918 at less than \$2 per cwt., the average of the group being \$1.68. These men were the really efficient dairymen of the district, men with considerably more than average ability in the breeding, feeding and general care of dairy cattle. On account of this natural ability they were able to make substantial profits for their year's work. On the former basis of calculation—5 per cent. interest on investment and no charge for operator's labor—their average Labor Income was \$1,797.

On the other hand it cost 36 farmers, of the same 139, more than \$3 per cwt. to produce milk. Some of them were very much over the \$3 mark, for the average of the group was \$4.20. On the old basis of calculation these men made an average Labor Income of \$312—considerably less than \$600 wages and an extra 2 per cent. on investment. At an average selling price of \$2.30 per cwt., they produced milk at a loss of \$1.90 per cwt., if they were to be allowed \$600 wages and 7 per cent. interest on investment.

The remaining 56 farms of the 139 ranged into two groups, 30 producing at \$2 to \$2.50 per cwt., and 26 at \$2.50 to \$3 per cwt. These were the men of average ability in the handling of dairy cattle.

It will be noted that the numbers of cows per farm in the first three groups in the table were nearly the same. In the lower group the herds were smaller but were still fair-sized milking herds.

On noting the amount of variation in the above table, the question naturally arises, "Just what figure can be taken to represent the cost of production of milk on Oxford County farms?" It cannot be said logically that the average cost of production was more than \$3 per cwt., although 36 farms out of a representative group of 139, or 26 per cent., did not produce at less than that rate. Neither can it be said that the cost of production was less than \$2 per cwt., although 47 farmers produced milk more cheaply than that. The figure to represent the cost of production on the *average* farm must be the average of the figures for all farms.

### AVERAGE COST OF PRODUCTION.

The average cost of production on 139 Oxford County farms, during the year ending February 28th, 1919, was \$2.61 per cwt. The average selling price was calculated on the same basis, for the same 139 farms and during the same year. It was found to be \$2.36 per cwt.

## SOME FACTORS WHICH TEND TO REDUCE COST OF PRODUCTION.

Following up the classification according to cost of production, and the establishing of figures to represent average cost and average selling price, a study was made of some of the main factors in the farm business which tended toward the lowering of cost of production, and, hence, the increasing of farm profits.

## HIGH MILK YIELD PER COW REDUCES COST OF PRODUCTION.

TABLE 12.

Yield per Cow-Herd Average	No. of Farms	Cost per Cwt.
Under 4001 lbs.....	27	\$3.96
4001-5000 lbs.....	35	2.55
5001-6000 lbs.....	46	2.28
6001-7000 lbs.....	20	2.15
Over 7000 lbs.....	11	2.05

As Table 12 shows, high milk yield per cow is, undoubtedly, the most potent factor in lowering the cost of production. As the yield per cow increases, the cost per hundredweight of milk steadily drops. With milk selling at an average price of \$2.36 per cwt. (see Table 11), the cow which produced less than 5,000 pounds within the year could be classed as a "boarder." It cost her owner \$2.55 or more to get 100 pounds of milk, which he had to sell for \$2.34.

Having found the great factor in reducing cost of production to be milk yield per cow, the next logical question is, "How best can milk yield per cow be increased, by feeding or breeding?" The following table was prepared to discover the relative effects, on the cost of production, of increased herd production by feeding and by breeding:

## BREEDING VS. FEEDING TO INCREASE MILK YIELD PER COW.

TABLE 13.

Farms With	All-Grade Breeding or Pure-Bred Sire Less than 5 Years	Pure-Bred Sire More than 5 Years
Feeding Low..... (below \$86 per cow)	No. of Farms.....45 Herd Average.....4400 lbs. Cost per Cwt.....\$3.08	No. of Farms.....31 Herd Average.....5400 lbs. Cost per Cwt.....\$2.03
Feeding High..... (above \$86 per cow)	No. of Farms.....30 Herd Average.....5400 lbs. Cost per Cwt.....\$3.00	No. of Farms.....33 Herd Average.....6100 lbs. Cost per Cwt.....\$2.28

Table 13 shows that both methods of increasing herd production are employed by the Oxford County dairymen. The upper left hand group were both poor feeders and poor breeders; consequently, their herd average was only 4,400 pounds per cow, and their average cost of production was \$3.08. The lower left hand

group were poor breeders but liberal feeders. By feeding alone, they raised their herd average to 5,400 pounds per cow, at an average cost of \$3 per cwt. The upper right hand group used the other method to increase milk yield. They were sparing feeders, but each man had used a pure-bred sire to head his herd for over five years. In consequence, their herd average was also 5,400 pounds per cow, but their cost of production was only \$2.03 per cwt. The breeding method is slower in bringing results, but it can be carried on in conjunction with the feeding method, and a comparison of the two last mentioned groups shows its distinct advantage.

On going still further and looking at the lower right hand group, which is composed of farmers who are good breeders and at the same time liberal feeders, it is seen that the herd average has been raised to 6,100 pounds per cow, but the cost per hundredweight has also been raised 25 cents per cwt., over the group above. This would lead to the suggestion that even though the breeding of the herd be good, it is possible to feed more than the cows can profitably convert into milk. In order to find the "danger point" in high feeding, the 64 farms, shown in Table 13 as having well-bred herds, were sorted into groups according to the amount of feed fed per cow. Table 14 shows the result:

#### WELL-BRED COWS CAN BE FED TOO HIGHLY FOR GREATEST PROFIT.

TABLE 14.

Feed per Cow	No. of Farms	Herd Average	Cost per Cwt.
Below \$71.....	15	5200	\$1.98
\$71-\$86.....	16	5600	2.07
\$87-\$101.....	20	5800	2.10
Over \$101.....	13	6500	2.55

It may be seen quite clearly that increased feeding increases both the milk yield per cow and the cost per hundred pounds. A well-bred dairy cow will naturally give a fair flow of milk, even though she be fed little more than a maintenance ration. This natural flow of milk is, of course, the most cheaply produced. As she is fed to produce more milk, so will the cost of that extra milk increase. But so long as this extra milk can be produced at less than market price, there is profit in producing it. In the first three groups in Table 14, where the cows were fed less than \$100 worth of feed each, the milk was produced at less than \$2.36—the average market price for the year. (See Table 11.) But in the last group, where the feeding was higher than \$100 per cow, the cost of production was \$2.55 per cwt., or more than the average selling price. Truly, these farmers raised their average herd production to 6,500 pounds per cow, but they did not do it profitably. The extent to which the owner of a well-bred herd may feed his cows will, of course, depend upon the price he receives for milk, but when he passes the \$100 mark he must proceed very cautiously.



