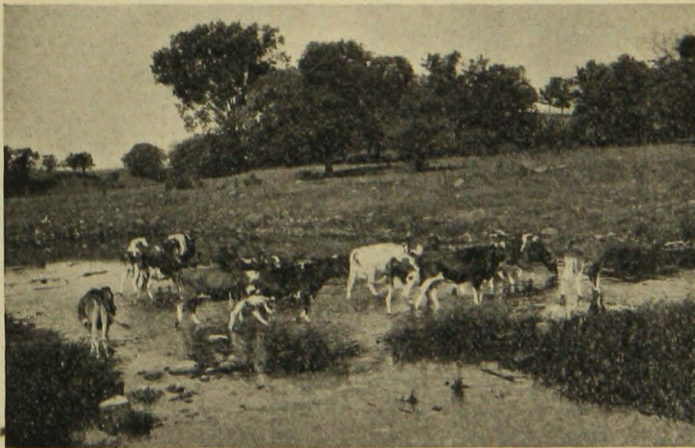


PROFITABLE DAIRYING



W. L. Cavert, Division of Agricultural Extension. G. A. Pond, Division of Farm Management, Agronomy and Plant Genetics. Agricultural Experiment Station



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SUMMARY

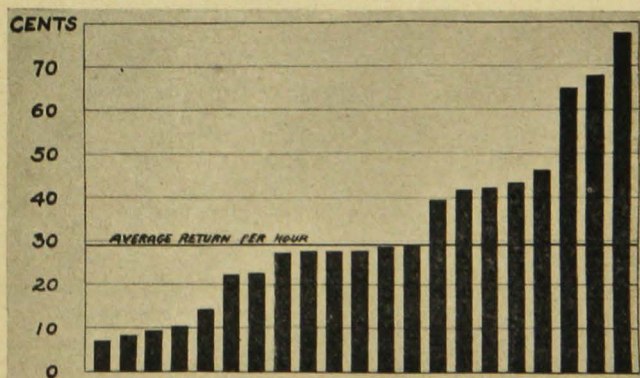
1. The return per hour for time spent in caring for cows among 21 cost co-operators in Steele County varied from 7 to 77 cents. Three obtained 65 cents or more.
2. The cows produced an average of 192 pounds of butterfat per year and consumed 1681 pounds of grain, 4.2 tons of silage, 1.2 tons of hay and corn fodder, and the equivalent of 4 months pasture; and required 167 hours of man labor. The average return per hour of man labor was 20 cents above market prices for feed and other expenses. If the charge for barn rent and horse labor is ignored, the average return per hour for man labor was 26 cents.
3. The starting point toward getting a higher return is to find the present return. The easy method used by a Freeborn county farmer on his own farm is illustrated.
4. The principal factors needing attention in order to get a return of 65 cents or more per hour are:
 - Feeding in proportion to production.
 - Feeding adequate rations.
 - Having adequate all-season pastures.
 - Weeding out the poor producers.
 - Having cows that are sired by purebred bulls of high producing ancestry.
 - Effectively controlling losses from abortion, tuberculosis, garget, and other diseases.
 - A reasonable overhead for barns and equipment.
5. High production and a high return per hour usually go together. The suggested goal is 300 pounds of fat per year as a herd average for specialized dairy herds, and 225 pounds per year for dual-purpose herds.
6. The most profitable number of cows will usually be determined by the number that can be milked without much increase in the cost of hired help over what would otherwise be incurred. A case is cited of a herd of 25 cows that produced an average of 179 pounds of butterfat, adding materially to the net income because employment was provided for available family labor.
7. Exclusive dairy farming is no more to be commended than exclusive wheat or cotton farming. There should be at least enough hogs and poultry to use the skim milk to advantage. In surplus coarse grain sections, hogs may be as important a part of the business as dairying. One or more of such crops as wheat, potatoes, flax, or rye may in many cases be advantageously raised for sale.

SOURCE OF DATA

During the years 1920-24 the Division of Agronomy and Farm Management, of the Minnesota College of Agriculture, in co-operation with the Bureau of Agricultural Economics of the United States Department of Agriculture, kept careful cost records of all products on a group of 22 farms in Steele County. On these farms sales of butterfat furnished 35 per cent of the income, and sales of dairy cattle and veal calves, about 17 per cent, a total of 52 per cent of the income. Next to the dairy enterprise, hogs were most important as a source of income, furnishing 25 per cent of the total. Data and observations from the Steele County cost route are the basis for much of the material here presented.

SEVEN OR SEVENTY-SEVEN CENTS PER HOUR

One of the striking features of the cost figures on the dairy enterprise is the wide variation in returns. For example, in 1924 the return for the time spent on dairy cows varied from 7 cents to 77 cents per hour. The farms were all in the same locality, had the same market, and nearly all the cows were grade or purebred of dairy breeding.



Return per hour, in 1924, for Each Co-operator
The length of the bar is in proportion to the return.

The diagram illustrates one of the important differences between working for wages in the city and dairy farming. In the city, workmen who are doing the same kind of work usually get about the same wage per hour. Their chief concern is to have a job. On the other hand, the dairy farmer is sure of a job but the wage received among 21 farmers varied from 7 to 77 cents per hour. Evidently the chief concern of the dairyman should be getting a better wage.

STORY OF AN AVERAGE COW

The following figures show the average returns per dairy cow from these farms on the basis of average prices for butterfat and feed that prevailed during 1923, 1924, and 1925, in Minnesota.

Return for Labor*

Receipts	
Butterfat, 192 lbs. @ 50c.....	\$ 96.00
Skim milk, 4800 lbs. @ 35c per cwt.....	16.80
Value of calf at birth.....	6.90
Manure, 10 loads at \$1.....	10.00
Total receipts	\$129.77
Expenses	
Ground oats, barley and oats, and oats and wheat succotash, 1160 lbs. @ \$1.25 per cwt.....	\$ 14.50
Ground corn, 346 lbs. @ \$1.43 per cwt.....	4.95
Mill feeds (mostly wheat bran), 141 lbs. @ \$1.42 per cwt..	2.00
Oilmeal, 34 lbs. @ 2½c.....	0.85
Silage, 42 tons @ \$4.67.....	19.61
Mixed tame hay, 1515 lbs. @ \$11.70 per ton.....	8.84
Alfalfa hay, 490 lbs. @ \$14.65 per ton.....	3.59
Corn fodder, 339 lbs. @ \$8.75 per ton.....	1.48
Wild hay, 107 lbs. @ \$8.75 per ton.....	0.47
Pasture, 181 days @ 4c.....	7.24
Total feed expense	\$63.53
Interest on \$80 @ 6 per cent.....	4.80
Depreciation	8.00
Sire service	5.00
Miscellaneous cash items (veterinary services, medicines, etc.)	0.42
Horse labor for cream hauling, 9 hours, @ 12c.....	1.08
Barn charge, including interest at 6% on inventory value, depreciation at 3%, and repairs.....	9.00
Unclassed items (taxes, insurance, interest on land in farmstead, and other overhead items).....	5.25
Total except for labor.....	\$ 97.08
Return for 167 hours of man labor.....	\$ 32.69
Return per hour.....	0.20
Return per hour if horse labor and barn rent are omitted as items of expense	0.26

* The production per cow and the quantities of feed used are the average for the five years, 1920-24 inclusive, while the prices for butterfat and feed are the averages of 1923-25 inclusive.

A question will be raised as to why the returns are figured in terms of earnings per hour above feed cost and other expenses instead of in terms of profit or loss per pound of butterfat. The answer is that the success of the dairy business under most conditions is dependent upon the extent to which it provides a good market for available farm labor. In many cases the justification for keeping dairy cattle in preference to beef cattle is that a herd of dairy cattle helps to utilize fully the time of the farmer and his family. Farmers frequently express this idea by saying "There is good money in dairying when it can be handled with family labor, but there is no money in it when the labor must be hired."

While a wage of 20 cents per hour is not particularly gratifying, it is well to keep in mind that average returns in any line of business usually show that the business just about pays the going wage and rate of interest for the labor and capital employed in it. With dairying, the returns tend to be somewhat below the prevailing wage for hired men because one engaged in the dairy business is competing to a considerable extent with dairymen who use considerable woman and child labor. Furthermore, many farmers are willing to put time on the dairy business at less than the prevailing hired-hand wages because a considerable part of the dairy work comes in the winter when the farm does not offer much other employment. They rightly figure that it is better to be employed at a modest wage than to get no income for these otherwise unproductive hours. However, one should change his practices as rapidly as possible in such a way as to get 50 to 75 cents for these hours.

HOW TO FIGURE WAGES PER HOUR

The starting point toward a higher return per hour is knowing just how one stands at present. The ease with which one may estimate roughly his own return per hour is illustrated by the following figures on his dairy herd furnished by a Freeborn County farmer.

This farmer says "I found it easy to keep such a record. I keep a record of farm receipts and expenses anyway so that I had the figures as to the sales of cream and livestock. I make it a practice to take an annual inventory of all my farm possessions so it was easy to compare the value of cattle on hand at the beginning and close of the year and thus determine the increase of inventory. I didn't keep any exact record of milk used in the house or of skim-milk fed to hogs and poultry. I estimated the amount used in the house at so much per day. In the case of skimmilk, I made a note one day each month as to about the amount that was being fed. In regard to feed, all my silage goes to cattle, so I turned to my annual

inventory and found that on January 1, I had 50 tons of silage. To this I added 75 tons produced during the year, giving a total of 125 tons. From this I deducted 55 tons, the amount on hand at the end of the year. This left 70 tons as the amount of silage consumed during the year. I calculated the amount of hay in a similar way except that I had to make an estimated deduction for the amount fed to horses. In the case of grain, I kept track of that by counting the sacks when I had it ground and occasionally testing out the weight of a sack. The pasture charge, shelter, and use of car were estimates, but estimates on these items may be approximately correct and do not materially affect the results. I estimated the hours of labor for myself and family by keeping track of the chore time on cows once or twice each month and using that as a basis of estimates. I was surprised that I could get such figures with so little work. My return per hour is not very satisfactory, but I am going to study this dairy business more carefully than I have in the past, and I think I know several things to do so that I will get decidedly more for my work after a year or two."

Receipts

Butterfat sold	\$ 971.30
Cows and calves sold.....	305.37
Milk used in house	30.00
Skimmilk for hogs and poultry.....	60.00
Increase in cattle inventory	32.00

Total	\$1398.67
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Expenses

Silage, 70 tons.....	\$ 280.00
Oats and barley, 8670 lbs.....	104.04
Clover hay, 10 tons.....	130.00
Wild hay, 10 tons.....	80.00
Pasture, 30 acres	135.00
Shelter	30.00
Use of car in delivering cream.....	20.00
Cattle purchased	52.50
Equipment	10.00
Cash items (feed grinding, veterinary services, and others)	45.70

Total expenses except labor.....	\$ 887.24
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Return for 1800 hours of labor.....	511.43
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Return per hour.....	0.28
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HOW TO GET A GOOD WAGE

Every one of the 22 Steele County dairymen would have been delighted to get 65 to 77 cents per hour for time put on cow chores, as did the highest three. What was the difference? The figures are inadequate to tell the whole story, but the most important items seem to be the following:

1. Feeding in proportion to production.
2. Having not only sufficient feed, but feed combinations that contain enough protein, succulence, variety, and other essentials; in other words, an adequate ration.
3. Having plenty of good pasture throughout the pasture season.
4. Weeding out the poorer producers by membership in a cow testing association or by keeping similar private records.
5. Using purebred sires of high producing ancestry.
6. Using the best available information as to how to avoid losses from tuberculosis, abortion, garget, and other diseases.
7. Avoiding overhead for barns and other equipment that is out of proportion to the number of cows kept.

In setting out to improve the returns per hour, it is important to find the weakest link in the chain. Many farmers who have had inadequate pastures could increase the returns 15 cents per hour by getting good all-season pastures. Others have good summer feed but have the big handicap of having only timothy or wild hay in the winter. Still others have plenty of good feed, but the cows have not the inherited ability to produce more than 175 to 200 pounds of butterfat. High bred animals will not produce much more than common cows if their feed in winter is timothy or wild hay with some oats and corn and if in summer their chief dependence is a slough pasture.

With attention to the items in the foregoing list in which one is weakest, those who are getting 20 cents per hour should find it fairly easy to raise the return to 40 cents. From this point progress is slower, but those who already have fairly well graded herds should get as much as 60 cents per hour in three or four years.

HIGH PRODUCTION AND HIGH RETURN PER HOUR GO TOGETHER

Generally speaking, a high return per hour goes with a high production per cow. A good goal is 300 pounds of butterfat per cow for well graded herds of specialized dairy breeds. This seems a comparatively easy goal to reach in view of the fact that some cows have produced over 1000 pounds of butterfat per year. However, if all cows and heifers of producing age that are kept for milk production

are included in the average, experience shows that careful attention to feeding, breeding, and weeding is necessary in order to reach the 300 pound goal.

Occasional farmers make fairly satisfactory returns per hour with a production of 200 pounds of butterfat per cow, or less. These are usually cases in which good legume hay, good silage, and good pasture enable them to reach this production with much less grain than is usually fed. With dual-purpose cattle, a good goal is a herd average of 225 pounds of butterfat per cow.



A Thrifty Bunch of Heifers

Well-grown calves indicate that the owner is a skillful feeder.

Feed Balanced Rations According to Production

Two problems in connection with grain feeding are giving the right amount and making sure of the right combination of feeds to meet the requirements for milk production. Most of the herds on the cost route probably received enough feed but, in several cases, the same feed would have given decidedly greater returns if it had been apportioned to each cow according to her production, as outlined in bulletins on dairy feeding, instead of giving each about the same amount. With herds of 12 cows or more, a valuable aid to feeding according to production is the use of production records obtained through membership in a cow testing association. About a hundred such associations are now in operation in Minnesota.

In many cases enough feed was given but the dry roughage was corn fodder, or hay that had relatively little clover in it. If a liberal supply of good clover or alfalfa hay is lacking, such high protein concentrates as linseed oilmeal or cottonseed oilmeal must be purchased in order to make the ration adequate. Linseed oilmeal is usually the cheapest and most satisfactory high-protein concentrate, under Minnesota conditions.

Until recently alfalfa has been a minor part of the hay supply in Steele County. However, in recent years the average has been increased rapidly. These cost records show that under Steele County conditions the cost of raising a ton of alfalfa was \$7.09 as compared to \$8.52 for tame hay. In addition to the lower cost of production, alfalfa is much superior to the ordinary mixed hay and has the advantage that after it is once started a fair to good crop is almost certain if seed of a hardy variety—Grimm or Cossack—is sown, and if sufficient fall growth is left for winter cover. With clover there are too many failures or partial failures due to winter killing and dry weather. On sandy soils, alfalfa has even greater advantages over clover, as the percentage of clover failures is much higher. With proper cultural practices alfalfa is almost certain to give a fair to good crop every year. On acid clay soils in northeastern Minnesota, growing alfalfa is still somewhat of an experiment, but the crop seems to be gaining in favor as farmers become acquainted with the necessary cultural practices.

Better Pastures Are Big Item

One of the interesting items in connection with the average feed expense is that 181 days of pasture is valued at \$7.24 while other feed for the year is valued at \$56.33. The cows did not get a complete living from the pasture for 181 days. It is estimated that they obtained the equivalent of four months' full feed. On this basis, the cost per month of feeding a cow on pasture is \$1.81 while the cost for eight winter months is \$7.05 per month. The idea has been frequently advocated that the ideal system of dairying would be to depend largely on stable feeding during the summer as well as in the winter. It is true that such a system will enable one to keep more cows on the same acres. However, the farmer is interested in making a good living rather than in keeping the most cows per farm. It is apparent that having an extra month or two of cheap pasture feed might save from \$6 to \$12 per head in the feed bill. In sections that have sufficient lime in the soil to raise alfalfa, sweet clover is of great assistance in providing plenty of good pasture. Those who have been most successful with it follow the plan of pasturing the second-year growth until after harvest. The sweet clover is seeded in the small grain and after the stocks are removed from the grain fields, the cattle are turned on this fresh pasture. If good rains occur shortly after the grain is cut, the pasture is very abundant and a long pasture season is secured. A long pasture season has a double advantage—it saves much stable work in addition to saving feed. Sweet clover seems to stand a reasonable amount of fall pasturing better than other clovers. In order to make certain of plenty of fall pasture, a generous acreage may be seeded,

as seed is usually cheap, and a part of it plowed up the following spring for corn. If first-year sweet clover is plowed under late in the fall or early in the spring before growth starts, it frequently is not completely killed and gives some trouble as a weed in the following crop. The white-blossom variety is more satisfactory than the yellow-blossom. In pasturing luxuriant growths of sweet clover, the same precautions must be taken against bloat as with other clovers.

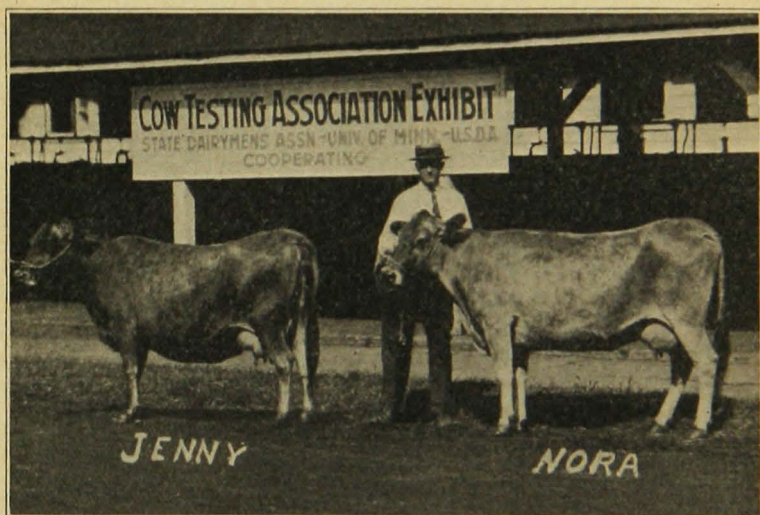
If pastures are permanent, they can be considerably improved by cutting weeds before they go to seed and keeping down brush. If brush and weeds are using a large part of the soil moisture and fertility, not much pasture can be expected. Keeping the cattle off in the spring until the pasture has a good start will also do much to insure an abundant supply of summer feed. Experiments at Coon Creek, Minn., indicate that drained peat soil makes a highly productive pasture, if it is rolled and the fertilizer deficiencies are supplied. Drainage should be sufficient to keep the water table at least 30 inches below the surface, for if the water rises higher it will be difficult to keep hummocks from forming. With the methods practiced at Coon Creek, it has been found that peat pasture will usually carry 2 head per acre. However, in planning such a pasture, a safer basis would be one head per acre. Usually either potash or phosphate or both is required on peat lands. In northeastern Minnesota lime may also be required. County agricultural agents will be glad to assist in planning trials that will test the returns from different fertilizers on peat pastures. The most successful peat land pasture is a mixture composed largely of Kentucky bluegrass (June grass) and "little white" or Dutch clover, with some alsike and timothy.

Even tho the pasture is good, experiments show that it is likely to pay to feed some grain all summer to cows that produce over a pound of butterfat per day. Also it is important to supplement the pasture as soon as it begins to fail, for if the milk flow is allowed to decrease for any length of time it can not be fully restored by later generous feeding.

Weeding Out Poor Producers Pays

Even with skilled feeding and well-bred sires not all of the herd will be high producers. Nearly all dairymen make some effort to weed out the poorer producers, but too frequently it is done by guess rather than upon the basis of records of butterfat production. Almost invariably when a herd is producing an average of over 300 pounds of butterfat, the owner is giving attention to feeding and breeding and has records of the milk and butterfat production of each cow. If the cows have not been well fed, it is difficult to weed intelligently,

as a cow with ability to produce 400 pounds of butterfat per year may produce little or no more than one with an ability to produce 200 pounds if only enough feed for the production of 175 pounds of butterfat is given. Frequently one year in a testing association results in increasing the herd average 40 to 50 pounds of butterfat per cow.



Know the Production of Each Cow

Two good looking cows from the same herd in the Plainview-Elgin Cow Testing Association. Testing showed that Jenny produced 454 pounds of fat in a year while Nora, under equally favorable conditions, produced 140 pounds. A herd of cows like Jenny should return 75c per man hour; a herd like Nora would merely pay feed costs and incidental expenses, leaving nothing for labor.

Sires of High Producing Ancestry Important

Over several years, good feeding and good breeding are about equally important. For a majority of dairymen, better feeding and pastures offer a large opportunity for increased profits in the immediate future. With poor rations there will be little difference in production between the animals with high producing ability and those with only medium producing ability; but when the high producing cow gets the right ration, she shows her superior ability. As a means of increasing production ability, the use of sires of high producing ancestry is of first importance. In the Steele County cost work, separate records were not kept as to the cost of keeping bulls. The estimated annual cost of keeping a purebred bull costing \$150 as a yearling is \$100 per year including feed, labor, depreciation, and barn rent. With a herd of 20 cows this is a charge of \$5 per cow. In smaller herds, the cost will be proportionately more. If farmers figured more closely on the extra production to be derived from the use of bulls of high producing

ancestors and on the cost of keeping bulls, there would be a greater tendency to use better bulls at less cost by co-operation in their ownership, especially where the herds are small, as in much of northeastern Minnesota.

Diseases an Economic Factor

No figures are available as to the losses to dairymen through abortion, garget, tuberculosis, and various calf ailments. However, one who discusses the economic factors of dairying with large numbers of dairy farmers during the year can not fail to be impressed with the fact that the successful control of these diseases is a big factor in getting a good return from the dairy herd. Every dairyman should make an earnest effort—by reading farm papers and agricultural college bulletins, and by consultation with local veterinarians—to learn just how each of the important diseases is spread and then take the sanitary measures necessary to prevent their spread. All agree that one of the most practical and effective measures that can be taken in controlling all contagious livestock diseases is for each farmer to make it a practice to introduce no new animals into his herd after a healthy herd is once established, except such new sires from healthy herds as may be necessary.

Barn an Item of Expense

Many farmers say that they can ignore the barn as an item of expense as they already have one. The statement is correct if no use can be made of it except for housing dairy cattle. However, if the owner is considering whether he will enlarge the barn to keep a larger herd, very careful calculations should be made as to how much the yearly charge for interest, depreciation, and insurance on the new barn is likely to be. A common estimate is that in order to return 6 per cent on the investment, and to cover depreciation, repairs, insurance, and taxes, a barn must increase the net income for each year by 10 per cent of its cost. A \$4000 barn must increase the income more than \$400 per year before any profit would be realized on the investment. If \$100 per cow is invested in shelter, and the annual charge is \$10, it would take more than 22 pounds of butterfat worth 45 cents a pound to pay the cost.

After making calculations as to barn costs, two questions should be answered: (1) Will the new barn add enough to the income to pay these items and leave a profit besides? (2) If funds are short and improvements are needed about the farm—tiling, clearing land, and similar items—is the barn more important than any other use to which the money can be put? In some cases, if careful advance estimates are made, the owner will decide that he had better use the old barn.

Sometimes extra barn capacity can be obtained at small cost by using straw sheds or other cheap buildings for yearlings. An open shed with a strong paddock attached is a better place for the bull than a pen in the barn. Frequently, room can be made for several cows by caring for the bull in this way.

That excellent results from dairy cattle can be secured with a very ordinary barn, is illustrated by the 4-year records kept in co-operation with a tenant farmer in southwestern Minnesota. During the 4-year period he had an average production of 299 pounds of butterfat from a herd kept in a barn no better than that found on the majority of rented farms. Probably the production would have been somewhat more and the labor somewhat less with a more modern barn, but by means of well bred cows and liberal feeding of balanced rations, he had the highest average for the 4 years, 1921-24 inclusive, of 44 co-operators who were keeping cost records.

One objection to building a more expensive barn than the general run of those found in a locality, is that if it should be necessary to sell the farm, the cost of such a barn can not often be fully recovered in the selling price.

Depreciation Also an Expense

In general, the higher the value of the animals the more the depreciation. A purebred cow worth \$300 finally goes to the packing plant as a canner, as does a grade cow, and brings the same price. If \$300 is paid for a purebred cow when an equally productive grade could be purchased for \$100, and if the purebred raised seven calves during her life, the extra \$200 depreciation would be a charge of \$28.57 against each of the seven calves at birth. In addition, there is interest on the extra investment. Any profits from the purebred cows will come from raising offspring so much more valuable for breeding purposes than grades that the extra charges can be met and leave a margin. Cows that are worth as much for beef as for dairy purposes have no depreciation except in case of death or advanced age.

During the 5 years, 351 cows, on an average, were kept on route farms. An average of 43 were sold each year for beef at an average age of 8 years, and 34 were sold for milk production at an average age of 6 years. The annual losses from death were 2.1 per cent. Thus, 24 per cent of the herd was replaced each year. The depreciation on the 6-year-old animals sold for milk production was passed on to purchasers. It is generally believed that well bred grades will give as large an average production as ordinary purebreds. In that case any increased profit from purebred cows must come from an increased value of the offspring that more than offsets the extra depreciation charge.

One factor that has a large influence in securing a low depreciation charge is the success of the dairyman in combatting such diseases as abortion, tuberculosis, and garget. Unfortunately, no records were kept as to the reasons for selling the 43 cows that were sold for beef purposes, but it is certain that disease losses were an important factor.

HOW MANY COWS TO KEEP

Every dairyman should give careful study to the problem of how many cows are likely to prove most profitable under his conditions. This is well illustrated by the figures for the farm of Mr. X., one of the co-operators on the Steele County route. The following is a summary of his dairy figures for 1924:

Per Cow Basis

Receipts		
Butterfat, 179 lbs. @ 47c.....		\$84.13
Skimmilk, 46 cwt. @ 34c.....		15.64
Appreciation		0.21
		<hr/>
Total		\$99.98
Expenses		
Expenses except for labor.....		59.15
Return for man labor (168 hours).....		40.83
Return per hour		0.24

This farmer and his family milked a herd that averaged 25 cows. The total return for labor was \$1036. Without a large dairy herd it would have been necessary for some members of this family to seek outside employment or to spend their time in partial idleness.

The wage earned was 24 cents per hour, but with the usual depreciation of about \$8 per cow, the return would have been less than 20 cents an hour.

This case illustrates the fact that a herd producing 180 pounds of fat per cow on ordinary farm feeds may decidedly increase the farm income even tho there would be little or no profit if the labor were charged against the cows at the rate for current wages. This illustrates how it has been possible for numerous farmers to make financial progress even tho cost records would have shown that they were getting less than the current wage rate for their labor. For providing a home job for a large family, the dairy cow has few rivals. With a return of 50 cents per hour, as some of his neighbors obtained from their dairy herds, it would have been profitable to keep a 25-cow dairy even tho it was necessary to hire additional help. This farm family would certainly enjoy the dairy chores much more if they could get the herd on a basis where it would return 50 to 60 cents per hour.

DAIRY FARMERS NEED DIVERSIFICATION AS DO WHEAT FARMERS

It is sometimes assumed that a farm that gets a large proportion of its income from dairy products is well diversified. However, as in the case of the wheat grower or cotton grower, there are serious objections to depending largely on one product. The farmer who trusts almost entirely to the dairy herd as a market for his feed and labor is likely to have years when abortion and other diseases will cause serious losses. Also short feed crops may make it necessary to spend a considerable part of the income for feed, if a reserve has not been carried over. However, these are not the only difficulties. One of the most important reasons for diversification on dairy farms is that if nearly everything that is raised is fed to dairy cows, the help required to care for the cows is sufficient to raise more crops than are needed for the cows.

As an illustration of this fact, the writers have in mind two farms. Both have excellent herds of about 20 Holstein cows each, with accompanying young stock. One is a 140-acre farm with 60 acres tillable. The other is a 200-acre farm with about 145 acres in crops. Each has one full-time man besides the operator. In addition, the 200-acre farm has extra help for about three months. However, on the 200-acre farm the extra acreage produces enough feed for about 120 hogs in addition to what is used for dairy cattle. The result is that the larger farm has been a good profit producer even in the depression from 1921 to 1925, while the farmer on the other has made no financial progress during that period.

In Steele County and other sections where corn grows well, considerably more is raised than is needed for silage. The bulk of the ear corn is fed to hogs. These make an excellent combination, for then both skim milk and corn are sold to much better advantage than if either product is fed too exclusively. Corn also makes a good market for the manure, as it responds to manure better than small grain crops.

Some farmers in southeastern Minnesota are finding that a few acres of winter wheat are a good additional source of income for dairy farmers under their conditions. One economical method of raising this crop is to drill it in a clean corn stubble as soon as the silo has been filled. This plan meets the requirements for a firm seedbed and the stubble helps to catch the snow. Spring wheat and flax are frequently grown for sale in connection with dairying in central and western Minnesota. Rye is frequently used as a cash crop to go with dairying on sandy land.

A flock of from 100 to 500 hens is an excellent side line for a dairy farm, particularly in sections where the bulk of the feed is home raised. As for hogs, skim milk is a big help. If there is not enough skim milk for both hogs and chickens, it is usually better to give the chickens all that they can use to advantage and, if necessary, buy tankage for the hogs. As an illustration of the value of a well handled poultry flock as a side line, figures are available from a Goodhue County farm for 1904-24, inclusive. As an average during this period, the receipts from poultry and eggs were \$412, the cost of feed was \$172, giving a return above feed cost of \$240 per year. The average number of hens on hand at the beginning of the year was 199 and the average egg production was 8.6 dozen per hen. The lowest return per dollar of feed was \$1.76 in 1908, the highest was \$4.60 in 1921. No record was kept of the labor and other expenses, but the flock was cared for with the same help as would have been on the farm in any case.

Perhaps the most frequent limiting factor in getting good profits from large flocks is failure to apply sanitation measures that will control diseases and parasites.

In the cutover section of northeastern Minnesota, potatoes are a popular cash crop in connection with dairy farms. On farms with a limited acreage, potatoes provide a market for more labor than would be possible if that acreage were devoted to grain or corn. Potatoes, like corn, respond generously to manure, so the dairy farmer who raises potatoes has a much better market for manure than if feed crops alone are raised. In the cutover section, hogs and chickens in larger numbers than are needed for the economical utilization of skim milk are under a disadvantage, because grain usually sells on the basis of the Duluth and Minneapolis market plus freight and handling charges, while sections that ship out grain receive Minneapolis or Duluth prices minus freight and handling charges.