

July 2017

The cost of production milk

H. B. Munger
Iowa State College

Follow this and additional works at: <http://lib.dr.iastate.edu/bulletin>



Part of the [Agricultural Economics Commons](#), and the [Dairy Science Commons](#)

Recommended Citation

Munger, H. B. (2017) "The cost of production milk," *Bulletin*: Vol. 16 : No. 197 , Article 1.
Available at: <http://lib.dr.iastate.edu/bulletin/vol16/iss197/1>

This Article is brought to you for free and open access by the Extension and Experiment Station Publications at Iowa State University Digital Repository. It has been accepted for inclusion in Bulletin by an authorized editor of Iowa State University Digital Repository. For more information, please contact digirep@iastate.edu.

THE COST OF PRODUCING MILK

AGRICULTURAL EXPERIMENT STATION
IOWA STATE COLLEGE OF AGRICULTURE
AND THE MECHANIC ARTS

FARM MANAGEMENT SECTION



AMES, IOWA

OFFICERS AND STAFF

IOWA AGRICULTURAL EXPERIMENT STATION

Raymond A. Pearson, M.S.A., LL.D., President
C. F. Curtiss, M.S.A., D.S., Director
W. H. Stevenson, A.B., B.S.A., Vice-Director

AGRICULTURAL ECONOMICS

E. G. Nourse, Ph.D., Chief
C. W. Hammans, B.S. (in A.), Asst.

AGRICULTURAL ENGINEERING

J. B. Davidson, B.S., M.E., A.E., Chief
E. V. Collins, B.S. in A.E., B.S. in
W. A. Foster, B.S. in E., B. Arch., Agron., Assistant Chief
Assistant

AGRONOMY

W. H. Stevenson, A.B., B.S.A., Chief
Paul Emerson, B.S., M.S., Ph.D., As-
H. D. Hughes, B.S., M.S.A., Chief in sistant Chief in Soil Bacteriology
Farm Crops
F. S. Wilkins, B.S., M.S., Assistant
P. E. Brown, B.S., A.M., Ph.D., Chief Chief in Farm Crops
in Soil Chemistry and Bacteriology
T. H. Benton, B.S., M.S., Soil Sur-
L. C. Burnett, B.S.A., M.S., Chief in veyor
Cereal Breeding
H. J. Harper, B.S., M.S., Field Experi-
L. W. Porman, B.S.A., M.S., Chief in ments
Field Experiments
D. S. Gray, Soil Surveyor
J. L. Robinson, B.S., M.S., Superin- W. G. Baker, B.S., Field Experiments
tendent of Co-operative Experiments
P. E. Nordaker, B.S., Soil Surveyor
H. W. Johnson, B.S., M.S., Assistant C. L. Orrben, B.S., Soil Surveyor
Chief in Soil Chemistry

ANIMAL HUSBANDRY

H. H. Kildee, B.S.A., M.S., Chief
P. S. Shearer, B.S., Chief in Animal
J. M. Evvard, B.S.A., M.S., Chief in Breeding
Swine and Beef Cattle Production
M. D. Helsler, M.S., B.S.A., Chief in
L. B. Sharp, M.S., Superintendent of Meat Investigation
Experiments in Animal Husbandry
A. C. McCandlish, M.S., Chief in Dairy
C. C. Culbertson, B.S. in A.H., As- Hu bandry
sistant Chief in Animal Husbandry
G. E. Weaver, M.S., Assistant Chief in
G. V. Glatfelter, M.S., Assistant in Dairy Husbandry
Animal Husbandry
H. A. Bittenbender, B.S.A., Chief in
A. R. Lamb, M.S., Chief in Nutrition Poultry Husbandry

BACTERIOLOGY

R. E. Buchanan, M. S., Ph. D., Chief; Associate in Dairy and Soil Bacteriology

BOTANY AND PLANT PATHOLOGY

L. H. Pammel, B.Agr., M.S., Ph.D., Chief
J. C. Gilman, B.S., M.S., Ph.D., As-
Charlotte M. King, Assistant Chief sistant Chief in Plant Pathology
R. F. Croford, Assistant in Plant
L. E. Melhus, B.S., Ph.D., Chief in Pathology
Plant Pathology

CHEMISTRY

W. G. Gaessler, B.S., M.S., Acting
A. R. Lamb, B.S., M.S., Assistant
Chief
Edith Wilson, Assistant

DAIRYING

M. Mortenson, B.S.A., Chief
W. A. Cordes, B.S., M.S., Assistant in
B. W. Hammer, B.S.A., Chief in Dairy Dairying
Bacteriology

ENTOMOLOGY

E. D. Ball, B.S., M.S., Ph.D., Chief
I. L. Ressler, B.A., M.S., Assistant in
F. A. Fenton, B.A., M.S., Ph.D., As- Entomology
sociate Chief in Entomology
Wallace Park, B.S., M.S., Assistant in
Albert Hartzell, B.S., M.A., Assistant Apiculture
in Entomology

FARM MANAGEMENT

H. B. Munger, B.S., Chief

HORTICULTURE AND FORESTRY

S. A. Beach, B.S.A., M.S., Chief
Rudolph A. Rudnick, B.S., Assistant in
T. J. Manev, B.S., Chief in Pomology Truck Crops
Harvey L. Lantz, B.S., Assistant Chief
G. B. MacDonald, B.S.F., M.F., Chief
in Pomology in Forestry
H. H. Plagge, Assistant in Pomology
Frank H. Culley, B.S.A., M.L.A., Chief
A. T. Erwin, M.S., Chief in Truck in Landscape Architecture
Crops

RURAL SOCIOLOGY

G. H. Von Tungeln, Ph.B., M.A., Chief

BULLETIN SECTION

F. W. Beckman, Ph.B., Bulletin Edi- Clara French Lawrence, Assistant Bul-
tor
letin Editor
E. H. Richardson, Photographer

THE COST OF PRODUCING MILK

By H. B. Munger

A study of milk production costs on 58 farms near Mason City, Cerro Gordo county, Iowa, covering the year November 1, 1916, to November 1, 1917, shows that the net cost of the 4,108,036 pounds of milk produced by the 900 cows on these farms was \$3.15 per 100 pounds under the conditions for that year. All charges that could properly be made against the milk were included and all credits were also considered.

On some farms the cost of production was less, as low as \$1.80 per 100 pounds, and on some it was much higher, as high as \$5.60 per 100 pounds. Feed and bedding costs, at the prices prevailing in Cerro Gordo county in the period covered, amounted to \$2.15 per 100 pounds of milk, while man and horse labor costs totaled 76 cents per 100 pounds. The cost for equipment, buildings, cows, bull service and other items made a total of 60 cents per 100 pounds. The credit for calves and manure was found to be 36 cents per 100 pounds of milk produced.

This investigation of the cost of producing milk was made in the fall of 1917 for the year which began November 1, 1916, and closed November 1, 1917. All of the 58 farms studied produced whole milk or cream for the Mason City market. They averaged 231 acres in size and maintained an average of 15½ cows per farm. Altho dairying was one of the principal sources of income on these farms, they were not what are ordinarily called specialized dairy farms. Receipts, other than from dairying, were not secured in this study, but probably a larger source of income than dairying is hogs, while considerable amounts of corn and oats are sold.

METHODS OF WORK

The survey method was used in this study to determine the cost of milk production. A trained investigator visited each farmer and from a prepared questionnaire secured the various items of cost. The farmers were interested in the study and tried to give accurate records. In a few cases they were unable to give satisfactory answers and such records were not used. A number of the farmers were members of a cow-testing association and were therefore in position to give accurate records of feed consumed by the cows, as well as of production of milk.

In calculating the cost of producing milk in this study, the cow was used as the unit. That is, the cost of growing young stock to maintain the dairy herd was eliminated and only the

cost of keeping the cows actually in the milking herd was considered. In this study it has been assumed that the growing of young stock and the production of milk are two distinct enterprises. Whenever heifers freshening for the first time entered the milking herd, they were valued at the current market price.

Cows produce three different products of value: milk, calves and manure. The relative values of these products vary with different conditions. In this study milk has been considered the main product, and calves and manure the by-products. From the total cost of keeping the cows is subtracted the value of calves and manure, in order to arrive at the net cost of milk.

ITEMS OF COST OF PRODUCING MILK

The various items of cost in producing milk have been divided in this study as follows: feed, bedding, man labor, horse labor, equipment, buildings, cow cost, bull cost, and miscellaneous.

FEED COST

Feed is the largest item of cost and will be considered under the various heads of grain, hay and other dry roughage, silage and pasture. Table I gives the prices of feeds on which the cost of milk in this study is based. Farm-grown feeds are charged at market price less the cost of hauling to market. Purchased feeds are charged at the price paid and the cost of hauling is included in the labor costs.

Grain. Grain constituted the largest single item of the feed cost, representing about one-third of the total (table II). Corn was two-thirds of the cost of grain, while oats was the other principal feed. Practically all of the corn and oats was grown on the farm where fed. Thirty-nine pounds of grain, costing 67.6 cents, were required in the production of 100 pounds of milk.

Hay and Other Dry Roughage. Hay and other roughage represented 26.2 percent of the total feed cost (table III). Mixed hay, clover hay and timothy hay made up nearly 80 percent of the hay and other dry roughage feed. Ninety-six pounds of hay and other dry roughage, costing 54.4 cents, were required in the production of 100 pounds of milk. Most of the alfalfa fed was purchased.

Silage and Other Succulent Feeds. Silage was the principal succulent feed used (table IV). Ten tons of sugar beet tops and eight tons of green sweet corn stalks were fed. On the average for the farms studied, 117.1 pounds of succulent feeds, costing 43 cents, were used in producing 100 pounds of milk.

TABLE I—PRICES OF PRINCIPAL FEEDS USED

| | Price per unit | | Price per unit |
|---------------------------------|----------------|----------------------------|----------------|
| Corn, per bushel | \$.96 | Corn silage, per ton | 7.35 |
| Oats, per bushel | .58 | Mixed hay, per ton | 13.35 |
| Shorts per ton | 38.00 | Timothy hay, per ton | 13.37 |
| Alfalfa meal, per ton | 32.92 | Clover hay, per ton | 15.74 |
| Gluten feed, per ton | 38.61 | Alfalfa hay, per ton | 16.80 |
| Bran, per ton | 32.03 | Wild hay, per ton | 10.70 |
| Cotton seed meal, per ton | 41.77 | Straw, per ton | 4.94 |
| Linseed oil meal, per ton | 45.36 | Corn stover, per ton | 5.34 |

TABLE II—AMOUNT AND VALUE OF GRAIN FED TO 900 COWS PRODUCING 4,108,036 POUNDS OF MILK

| | Total weight in pounds | Total value | Amount required per 100 lbs. of milk | Cost per 100 lbs. milk | Percent of total value of grain |
|------------------------|------------------------|-------------|--------------------------------------|------------------------|---------------------------------|
| Corn | 1,088,696 | \$18,715 | 26.5 | \$.456 | 67.3 |
| Oats | 291,232 | 5,288 | 7.1 | .129 | 19.0 |
| Corn meal | 36,030 | 216 | .8 | .005 | .8 |
| Shorts | 20,000 | 380 | .5 | .009 | 1.4 |
| Alfalfa meal | 13,000 | 214 | .3 | .005 | .7 |
| Mill feed | 800 | 22 | .02 | .001 | .1 |
| Red dog flour | 2,000 | 45 | .05 | .001 | .2 |
| Gluten feed | 21,600 | 417 | .5 | .010 | 1.5 |
| Bran | 64,900 | 1,040 | 1.6 | .025 | 3.7 |
| Cotton seed meal | 40,080 | 837 | 1.0 | .020 | 3.0 |
| Linseed oil meal | 28,000 | 635 | .7 | .015 | 2.3 |
| Total | 1,606,308 | \$27,809 | 39.1 | \$.676 | 100.0 |

TABLE III—AMOUNT AND VALUE OF HAY AND OTHER DRY ROUGHAGE FED TO 900 COWS PRODUCING 4,108,036 POUNDS OF MILK

| | Total weight in pounds | Total value | Amount required per 100 lbs. milk | Cost per 100 lbs. milk | Percent of total value of hay and roughage |
|-------------------|------------------------|-------------|-----------------------------------|------------------------|--|
| Mixed hay | 1,159,500 | \$ 7,740 | 28.2 | \$.188 | 34.6 |
| Clover | 664,000 | 5,226 | 16.2 | .127 | 23.4 |
| Timothy | 586,000 | 3,916 | 14.3 | .095 | 17.5 |
| Alfalfa | 165,000 | 1,386 | 4.0 | .034 | 6.2 |
| Wild hay | 192,000 | 1,027 | 4.7 | .025 | 4.6 |
| Corn stover | 784,500 | 2,099 | 19.0 | .051 | 9.4 |
| Straw | 393,500 | 972 | 9.6 | .024 | 4.3 |
| Total | 3,944,500 | \$22,363 | 96.0 | \$.544 | 100.0 |

TABLE IV—AMOUNT AND VALUE OF SILAGE AND OTHER SUCCULENT FEEDS FED TO 900 COWS PRODUCING 4,108,036 POUNDS OF MILK

| | Total weight in pounds | Total value | Amount required per 100 lbs. of milk | Cost per 100 lbs. | Percent of total value of silage, etc. |
|--------------------------------|------------------------|-------------|--------------------------------------|-------------------|--|
| Silage | 4,771,500 | \$17,526 | 116.2 | \$.427 | 99.4 |
| Beet tops | 20,000 | 70 | .5 | .002 | .4 |
| Sweet corn stalks, green | 16,000 | 40 | .4 | .001 | .2 |
| Total | 4,807,500 | \$17,636 | 117.1 | \$.430 | 100.0 |

TABLE V—VALUE OF PASTURE USED BY 900 COWS IN THE PRODUCTION OF 4,108,036 POUNDS OF MILK

| | Total value |
|--|-----------------|
| Value of 1695 acres of pasture land, \$260,125 | |
| Interest and taxes—5½ percent of \$260,125 | \$14,307 |
| Depreciation and repair of fences | 1,910 |
| Manuring pasture | 378 |
| Grass seed | 19 |
| Mowing weeds | 2 |
| Rent of 32 acres of pasture | 99 |
| Total | \$16,715 |

Pasture. In determining the pasture cost, each farmer was asked the number of acres of pasture used by his herd of milk cows during the season. In case other stock occupied the pasture with the dairy herd the farmer calculated the proper charge that should be made against the cows. On the 58 farms 1,695 acres of land, valued at \$260,125, were pastured. The average value of pasture land was \$153 per acre. In addition 32 acres were rented. The cost of pasture was determined by charging 5½ percent on the value of land (5 percent interest, ½ percent taxes) and adding depreciation and repair of fences, manuring pasture, re-seeding, mowing weeds and cash paid out for pasture. A total of 1,727 acres (including 32 acres rented) were pastured, costing \$16,715 or \$9.68 per acre. The pasture cost per 100 pounds of milk was 40.6 cents. Nearly two acres of pasture were required per cow. It is to be pointed out that in the above estimate of pasture costs, allowance is made for the manure dropped while on the pasture in the low interest rate or rental charged. The manure item in the following table refers to manure applied from the barns.

Corn Stalks Pastured. Four hundred thirty-three acres of corn stalks were pastured and valued at \$414. In case horses were pastured in the same field with cows, allowance was made in figuring the charge for the dairy herd.

TABLE VI—TOTAL AMOUNT AND VALUE OF FEED USED BY 900 COWS PRODUCING 4,108,036 POUNDS OF MILK

| | Amount | Total value | Amount required per 100 lbs. of milk | Value per 100 lbs. milk | Percent of total value of feed |
|----------------------------------|----------------|-----------------|--------------------------------------|-------------------------|--------------------------------|
| Grain | 1,606,368 lbs. | \$27,809 | 39.1 | \$.676 | 32.6 |
| Hay and other roughage | 3,944,500 lbs. | 22,335 | 96.0 | .544 | 26.2 |
| Silage and other succulent feeds | 4,807,500 lbs. | 17,633 | 117.1 | .480 | 20.7 |
| Pasture | 1727 acres | 16,715 | — | .403 | 19.6 |
| Corn stalks pastured | 433 acres | 414 | — | .010 | .5 |
| Salt | 29,823 lbs. | 304 | .7 | .007 | .4 |
| Total | | \$85,244 | | \$2.073 | 100.0 |

Salt. Salt to the amount of 29,823 pounds (152.17 barrels), costing \$304, was used during the year by 900 cows.

Summary of Feed Cost. In table VI are summarized the different kinds of feed used by 900 cows during the year. On the average, 39.1 pounds of grain, 96 pounds of hay and other dry roughage and 117.1 pounds of succulent feeds in addition to pasture were used in the production of 100 pounds of milk. The feed cost per 100 pounds of milk is \$2.073. This was more than the price received by farmers for milk at the time the investigation was made.

BEDDING

A total of 546 tons of bedding were used by 900 cows, or a little over one-half ton per cow. The total value of bedding was \$2,778, or 1.9 percent of the gross cost of milk production, and 7 cents per 100 pounds of milk. Oat straw was the principal material used for bedding, a small amount of poor quality hay making up the remainder.

MAN LABOR

For convenience in getting the data from farmers, the time required in the production of milk was divided into various operations, such as milking, feeding, care of milk utensils, hauling feed and bedding, hauling milk and other miscellaneous work (table VII). In all, 147.4 hours of labor were required per cow and 3.228 hours per 100 pounds of milk. The labor cost of 100 pounds of milk was 64.58 cents.

No effort was made to determine the labor rates on individual farms. From the results of cost accounts kept on other farms in various parts of the state, a rate of 20 cents per hour was decided upon and is used in all calculations in this study.

TABLE VII—MAN LABOR COST OF PRODUCING 4,108,036 POUNDS OF MILK

| | Total hours of man labor | Total value | Hours per 100 lbs. of milk | Value per 100 lbs. of milk |
|-----------------------------|-----------------------------|----------------|-------------------------------|-------------------------------|
| Milking | 54,183 | \$10,833 | 1.318 | \$.2637 |
| Other daily chores | 46,599 | 9,320 | 1.134 | .2268 |
| Hauling feed and bedding .. | 6,040 | 1,208 | .147 | .0294 |
| Milk hauling | 23,569 | 4,714 | .574 | .1148 |
| Miscellaneous work | 2,275 | 455 | .055 | .0111 |
| Total..... | 132,649 | \$26,530 | 3.228 | \$.6458 |

HORSE LABOR

The cost of horse labor was determined in a manner similar to that of man labor (table VIII). From the results of cost accounts a rate of 10 cents per horse hour was considered conservative. It required 57.3 hours of horse labor per cow or 1.2 hours per 100 pounds of milk. About two-thirds of the horse labor was used in milk hauling.

TABLE VIII—HORSE LABOR COST OF PRODUCING 4,108,036 POUNDS OF MILK

| | Total hours horse labor | Total value | Hours per 100 lbs. of milk | Value per 100 lbs. of milk |
|--|----------------------------|----------------|-------------------------------|-------------------------------|
| Milk hauling | 33,481 | 3348 | .8 | .08 |
| Hauling feed and miscellan- eous work | 17,137 | 1714 | .4 | .04 |
| Total | 51,618 | 5062 | 1.2 | .12 |

EQUIPMENT

Equipment for the dairy enterprise includes milking machine, engine, milk wagons, cans, pails, strainers and other minor equipment. Items of cost are represented by depreciation, repairs and interest on the average inventory. Depreciation was found by dividing the present value of each piece of equipment by its probable years of usefulness. All estimates were made by the farmers. Seven and a half percent is charged on the average inventory value, 7 percent being for interest and $\frac{1}{2}$ percent for taxes.

Of the total cost of dairy equipment, \$1,971 is accounted for by depreciation. About one-third of the total value of equipment was found in milking machines, the depreciation on which was considered high by most farmers. The equipment charge is about .2 percent of the gross cost of producing 100 pounds of milk.

TABLE IX—DAIRY EQUIPMENT COST OF PRODUCING 4,108,036 POUNDS OF MILK

| | |
|---|----------------|
| Value of equipment beginning of year..... | \$7,930 |
| New equipment purchased | 1,513 |
| Total of beginning inventory and equipment purchased | \$9,443 |
| Value of equipment close of year..... | 7,472 |
| Depreciation | \$1,971 |
| Repairs | 257 |
| Interest on average inventory at 7.5 percent..... | 578 |
| Total cost | \$2,806 |

BUILDINGS

Building charges against the dairy business are difficult to determine accurately. Depreciation of buildings is a part of the cost and this is influenced by the life of the building. In this study the value of buildings in their present condition was secured and also an estimate of their future years of usefulness. Present value divided by future life is the depreciation.

On many farms horses, and to some extent hogs, were kept in the same barn with the dairy cows. In such cases farmers estimated the proportion of the building used by the cows and these estimates were made the basis of the building charges.

An average investment of \$61,278 was found in buildings, or nearly \$70 per cow. The building cost includes depreciation,

TABLE X—BUILDING COST IN PRODUCING 4,108,036 POUNDS OF MILK

| | |
|----------------------------------|-----------------|
| Value 1st inventory | \$32,238 |
| Value 2d inventory | 69,214 |
| Depreciation | 2,029 |
| Insurance | 259 |
| Repairs | 2,137 |
| Interest (\$61,278 at 5½%) | 3,370 |
| Total | \$ 7,795 |

insurance, repairs, interest and taxes. The total building charge is a little over 12 percent of the value of buildings. The average depreciation was 3.3 percent, indicating that the buildings occupied by the dairy stock are calculated to last about thirty years. Five percent is charged for interest on buildings and one-half percent for taxes. No attempt was made to secure taxes, but it has been found that these closely approximate .5 percent of the actual valuation. Buildings are no small item in the cost of producing milk. In this study the cost of buildings represents 5.25 percent of the gross cost and 19 cents per 100 pounds of milk.

COW COST

One of the costs of producing milk is the maintenance of the dairy herd. During the year this study was made, 194 cows were sold and 15 cows died. This would indicate that cows are kept in the milking herd on these farms an average of 4½ years. The depreciation on these cows was \$1,159. Interest at 7 percent and taxes ½ percent on the average inventory value of the cows amounted to \$1,157.75. The items of depreciation, interest and taxes total \$6,934 and make up what is termed the cow cost. This represents 4.8 percent of the gross cost of producing milk, or 17 cents per 100 pounds of milk.

TABLE XI—COW COST OF PRODUCING 4,108,036 POUNDS OF MILK

| | Number | Average value | Total value |
|---|-------------|---------------|-----------------|
| Cows on farms at beginning of year..... | 890 | \$85 | \$75,254 |
| Cows purchased | 94 | 94 | 8,819 |
| Heifers freshened entering herd | 134 | 72 | 10,670 |
| Total | 1118 | | \$94,743 |
| Cows on farms at end of year..... | 900 | \$87 | \$78,755 |
| Cows so'd | 194 | 76 | 14,709 |
| Cows died | 15 | | 120 |
| Sale of hides | | | |
| Total | 1118 | | \$93,534 |
| Depreciation | | | 1,159 |
| Interest (7 percent) and taxes (½ percent) on average inventory value | | | 5,775 |
| Total | | | \$ 6,934 |

BULL COST

From each farmer keeping a bull was secured a detailed estimate showing the cost of maintenance, including feed, labor, depreciation or appreciation, interest and building charges. The cost of keeping bulls was secured separately from the costs of keeping the cows. Receipts from service fees were deducted from the total cost in order to determine the net cost chargeable to a herd. Forty-seven of the fifty-eight farms maintained bulls all or a part of the year. The total cost for all farms was \$3,910, which constituted 2.7 percent of the gross cost, or 10 cents per 100 pounds of milk.

TABLE XII—BULL COST IN THE PRODUCTION OF 4,108,036 POUNDS OF MILK

| | | |
|--|---------|----------|
| Value of bulls at beginning of year..... | \$5,881 | |
| Value of bulls purchased | 1,124 | |
| Sum of values at beginning of year and purchased..... | | \$7,005 |
| Value of bulls at end of year..... | \$5,905 | |
| Value of bulls sold | 1,608 | |
| Sum of values at end of year and sold..... | | \$7,513 |
| Expenses: | | |
| Feed and bedding | \$3,645 | |
| Interest (7 percent) and taxes (.5 percent) on average inventory.... | 443 | |
| Labor | 590 | |
| Buildings | 215 | |
| Total..... | | \$4,893 |
| Returns: | | |
| Manure | 420 | |
| Service fees | 55 | |
| Net increase in value of bulls..... | 508 | |
| Total..... | | \$ 983 |
| Net cost of bull service..... | | \$ 3,910 |

MISCELLANEOUS COSTS

Table XIII shows the miscellaneous items entering into the cost of producing milk. The largest single item was \$641 paid out by farmers who hired their milk hauled. A total of \$2,967 is classed as miscellaneous and represents 2.1 per cent of the gross cost, or 7 cents per 100 pounds of milk.

TABLE XIII—MISCELLANEOUS COSTS IN PRODUCING 4,108,036 POUNDS OF MILK

| | Total value |
|------------------------------------|-------------|
| Milk hauling | \$641.00 |
| Feed grinding | 407.30 |
| Veterinary fees | 394.50 |
| Cow testing association fees | 354.00 |
| Insurance on cows | 310.10 |
| Breeding fees | 202.50 |
| Expense in buying cows | 176.90 |
| Medicines and disinfectants | 158.90 |
| Milk testing, acids, etc. | 110.00 |
| Registration fees | 87.00 |
| Advertising | 75.00 |
| Ice | 50.00 |
| Total..... | \$2,967.20 |

RETURNS OTHER THAN MILK

Calves. The 900 cows produced 794 calves, or about 88 for every 100 cows. The remaining cows either did not freshen or lost their calves. Table XIV shows the number vealed and the number of heifers and bulls, both grades and pure bred, that were raised.

In this study calves were valued at birth and an estimate secured from farmers as to the amount of milk fed to calves. This, together with milk used in the house, was credited to the dairy herd at the same price as milk sold. The value of calves at birth amounted to \$6,616 or \$7.35 per cow and 16 cents per 100 pounds of milk.

TABLE XIV—CALVES

| | Number | Average value | Total value |
|-------------------------------|------------|---------------|----------------|
| Calves vealed | 411 | \$ 5.99 | \$2,433 |
| Grade heifers raised | 260 | 8.85 | 2,300 |
| Purebred heifers raised | 42 | 23.57 | 990 |
| Grade bulls raised | 66 | 6.76 | 446 |
| Purebred bulls raised | 15 | 27.00 | 405 |
| | | | \$6,614 |
| Calf hides sold | | | 12 |
| Total | 794 | | \$3,616 |

MANURE

Each farmer estimated the number of tons of manure from cows hauled from barn and yards during the year. The total for all farms amounted to 5,400 tons. This was about 6 tons per cow. Manure was valued at \$1.50 per ton at the barn, making a manure credit of \$9.02 per cow or 20 cents per 100 pounds of milk. No account was taken of manure produced on pasture. If this had been done the manure credit would have been higher and the pasture rate per cow would have been correspondingly higher, but the net result would remain unchanged.

DISPOSAL OF MILK

Table XV shows the disposal of milk. About 88 percent of it was sold, the rest being used in the house and by calves. In calculating the cost of producing milk the total amount was used as the basis.

TABLE XV—DISPOSAL OF MILK

| | Pounds of milk |
|----------------------------------|------------------|
| Milk sold | 3,607,567 |
| Milk used by calves vealed | 144,839 |
| Milk used by calves raised | 203,953 |
| Milk used in house | 151,677 |
| Total | 4,108,036 |

SUMMARY OF COSTS OF PRODUCING 4,108,036 POUNDS OF MILK

A summary of the cost of producing milk is given in table XVI. The feed cost per cow was \$94.72, or about 60 percent of the gross cost. Labor was the next largest factor of the cost of production, representing 18.4 percent of the gross cost. The total gross cost per cow was \$160.03.

TABLE XVI—SUMMARY OF COST OF PRODUCING MILK

| Item | Total cost | Percent of total cost | Cost per cow | Cost per 100 lbs. of milk |
|-------------------------------|------------------|--------------------------|-----------------|------------------------------|
| Feed | 86,244 | 59.2 | \$94.72 | \$2.68 |
| Bedding | 2,778 | 1.9 | 3.09 | .07 |
| Man labor | 26,530 | 18.4 | 29.48 | .64 |
| Horse labor | 5,062 | 3.5 | 5.62 | .12 |
| Equipment | 2,801 | 2.0 | 3.12 | .07 |
| Buildings | 7,795 | 5.4 | 8.66 | .19 |
| Cow cost | 6,034 | 4.8 | 7.70 | .17 |
| Bull cost | 3,970 | 2.7 | 4.34 | .10 |
| Miscellaneous | 2,967 | 2.1 | 3.30 | .07 |
| Total cost | \$144,026 | 100.0 | \$160.03 | \$3.51 |
| Credits not milk | | | | |
| Calves | 6,616 | | 7.35 | .16 |
| Manure | 8,115 | | 9.02 | .20 |
| Total credits | 14,731 | | 16.37 | .35 |
| Net cost | \$129,295 | | \$143.63 | \$3.15 |

The value of calves and manure per cow was \$16.37, subtracting which from the gross cost gives \$143.66 or the yearly net cost per cow. The average production of milk per cow was 4,565 pounds, costing \$3.15 per hundred pounds.

Values of feed, labor and other factors entering into the cost of producing milk are continually changing. The amounts of feed and labor required per 100 pounds of milk remain about the same, regardless of prices. In this area where the average production per cow was 4,565 pounds, the approximate cost of producing 100 pounds of milk can be determined by taking the various amounts of feed and labor and using current values.

With the prices prevailing at the time of this study (1916-17), the cost of producing 100 pounds of milk is obtained as shown in the accompanying figures. It will be noted that only the main items of feed and man and horse labor are worked out in detail. They are readily figured. However, the equipment, building, cow cost, bull cost and other miscellaneous items, as well as the credits not milk, are not so readily figured. For practical purposes, 12 percent of the total cost of feed and labor may be assumed to cover these items. When this 12 percent is added to the cost of feed and man and horse labor, it gives the net cost of 100 pounds of milk.

| | |
|-----------------------------------|---------|
| Grain, 39.1 pounds | \$.676 |
| Hay, 67.3 pounds | .439 |
| Other dry roughage, 28.7 pounds | .075 |
| Silage, 117.1 pounds | .430 |
| Pasture, 3.7 days | .406 |
| Man labor, 3.23 hours | .646 |
| Horse labor, 1.2 hours | .120 |
| Cost of feed, man and horse labor | \$2.822 |
| 12 percent of feed and labor cost | .338 |
| Net cost of 100 pounds of milk | \$3.160 |

The average number of pasture days per 100 pounds of milk was obtained as follows: The average number of days that cows were on pasture multiplied by the number of cows gives the total days of pasture, dividing which by the total hundred-weight of milk produced gives the number of days per 100 pounds.

The prices of feedable crops are influenced in a large measure by the demand for them as feed for hogs, beef cattle, dairy cattle and other live stock. In this area dairy cattle form a small part of this demand. Unless the price of milk is sufficiently high to pay for the feed and other costs in the production of milk, farmers will turn to the raising of other live stock, or will sell crops. It is important to the consumer that the producer shall receive a price for milk that will bring about an adequate and continuous supply. In the region of this study and in others where similar conditions are found, it is believed that data here-in presented will be of help in establishing a fair price for milk.

VARIATION IN COST OF PRODUCING MILK

While the average cost of producing milk was \$3.15 per 100 pounds, there was a wide variation in cost on different farms. Table XVII shows the variation in cost in various herds.

Two farms produced milk for slightly under \$1.80 per 100 pounds. On one farm the cost was over \$5.60. About 40 percent of the farms, having 42 percent of the cows, produced 46 percent of the milk for \$3.15 or less per 100 pounds. Sixty percent of the farms produced milk at a cost higher than the average. Farmers received approximately \$2.00 per hundred for milk during the year of this study. Only 5 out of 58 produced milk for \$2.00 or less. More than nine-tenths of the farmers received less than market prices for feeds consumed by cows, or less than 20 cents per hour for their labor on the dairy herd, or both.

This was at a time when feed prices had advanced, but prices of milk and other dairy products had not come into adjustment. Shortly following the conclusion of this study the milk producers' organization made a contract with the distributors

TABLE XVII—VARIATION IN COST OF PRODUCING 100 POUNDS OF MILK

| Cost of Producing 100 pounds of milk | Number of farms | Cumulative percent of number of farms | Number of cows | Cumulative percent of number of cows | Pounds of milk produced | Cumulative percent of milk produced |
|--------------------------------------|-----------------|---------------------------------------|----------------|--------------------------------------|-------------------------|-------------------------------------|
| \$1.80 and less | 2 | 3.4 | 22.0 | 2.4 | 141,308 | 3.4 |
| 1.81-22.00 | 3 | 8.6 | 61.5 | 9.3 | 345,457 | 11.8 |
| 2.01-2.20 | 4 | 15.5 | 59.0 | 15.8 | 336,239 | 20.0 |
| 2.21-2.40 | 3 | 20.7 | 64.5 | 23.0 | 292,942 | 27.2 |
| 2.41-2.60 | 3 | 25.9 | 50.5 | 28.6 | 229,229 | 32.7 |
| 2.61-2.80 | --- | --- | --- | --- | --- | --- |
| 2.81-3.00 | 4 | 32.8 | 45.0 | 33.6 | 217,198 | 38.0 |
| 3.01-3.20 | 5 | 41.4 | 88.0 | 43.4 | 415,917 | 48.2 |
| 3.21-3.40 | 7 | 53.4 | 88.0 | 53.2 | 473,682 | 59.7 |
| 3.41-3.60 | 5 | 62.1 | 63.0 | 60.2 | 287,246 | 66.7 |
| 3.61-3.80 | 4 | 69.0 | 55.0 | 63.3 | 291,860 | 73.8 |
| 3.81-4.00 | 3 | 74.1 | 20.5 | 68.6 | 100,523 | 76.2 |
| 4.01-4.20 | 2 | 77.6 | 43.5 | 73.4 | 123,910 | 79.2 |
| 4.21-4.40 | 5 | 89.2 | 72.5 | 81.5 | 283,881 | 86.2 |
| 4.41-4.60 | 1 | 87.9 | 33.5 | 85.2 | 101,940 | 88.6 |
| 4.61-4.80 | 2 | 91.4 | 48.0 | 90.6 | 202,209 | 93.6 |
| 4.81-5.00 | 1 | 93.1 | 7.0 | 91.3 | 32,786 | 94.4 |
| 5.01-5.20 | 3 | 98.3 | 67.0 | 98.8 | 203,258 | 90.4 |
| 5.21-5.40 | --- | --- | --- | --- | --- | --- |
| 5.41-5.60 | --- | --- | --- | --- | --- | --- |
| 5.61 and over | 1 | 100.0 | 11.0 | 100.0 | 25,442 | 100.0 |
| Total | 58 | | 899.5 | | 4,104,036 | |

whereby they received \$3.15 per hundred for milk testing 3.5 percent butterfat, and 5 cents per hundred additional for milk testing 0.1 percent above this standard. The average test for the herds studied was 3.7 percent, making an average price for milk of \$3.25 per hundred.

SEASONAL COST OF MILK PRODUCTION

In this study the year was divided into periods in order to determine the relative costs of producing milk at different seasons of the year. The usual practice is to turn the cows out about the 10th of May, feeding them nothing but pasture for a period of four to five months. When pasture becomes short, farmers feed some grain and roughage in addition. Thus, in this study the year was divided into three parts: Full pasture season, part pasture season and winter season. Each farmer was asked the date when his cows were turned out to pasture, when extra feed was given in addition to pasture and, finally, when the winter feeding period began. Likewise, feed, bedding and man and horse labor were obtained according to the amounts used during the different seasons. In table XVIII these are charged in proportion to the amounts actually used in different seasons. The remaining items of cost, i. e., equipment, buildings, cow cost, bull cost and miscellaneous, are yearly costs, not varying with the seasons as feed and labor. These costs are, therefore, apportioned according to the length of the different seasons.

Value of calves is credited according to the length of the various seasons. No manure is credited to the full pasture season. The manure credit is divided between the part pasture and winter seasons on the basis of the amounts of feeds consumed during those seasons.

TABLE XVIII—SEASONAL COST OF PRODUCING 4,108,036 POUNDS OF MILK

| | Full pasture season | Part pasture season | Winter season |
|---|------------------------|------------------------|------------------|
| Length of season (days) | 140 | 48 | 177 |
| Length of season (percent) | 38.4 | 13.1 | 48.5 |
| Feed | \$14,623 | \$ 9,976 | \$50,615 |
| Bedding | 879 | 193 | 2,582 |
| Man labor | 7,879 | 2,242 | 16,409 |
| Horses | 887 | 604 | 3,571 |
| Equipment | 1,078 | 368 | 1,360 |
| Buildings | 2,993 | 1,021 | 3,781 |
| Cow cost | 2,633 | 908 | 3,363 |
| Bull cost | 1,501 | 512 | 1,897 |
| Miscellaneous cost | 1,139 | 389 | 1,439 |
| Total gross cost | \$32,763 | \$16,216 | \$95,047 |
| Credits not milk: | | | |
| Value calves | \$ 2,541 | \$ 866 | \$ 3,209 |
| Value manure | ----- | 812 | 7,303 |
| Total | \$ 2,541 | \$ 1,678 | \$10,512 |
| Net cost of milk | \$30,222 | \$14,538 | \$84,535 |
| Pounds of milk produced | 1,528,447 | 484,272 | 2,095,317 |
| Percent of milk produced by seasons | 37.2 | 11.8 | 51.0 |
| Cost per 100 pounds of milk | \$1.98 | \$3.00 | \$4.03 |

The cost per 100 pounds of milk was \$1.98 while cows were on full pasture, \$3.00 while on part pasture and part other feed, and \$4.03 during the winter season. On these farms and with feed prices prevailing at the time, the cost of producing milk was twice as much in winter as in summer. This cannot be attributed to a lack of winter production. The winter season was 48.5 percent of the year, during which time 51 percent of the milk was produced. The results indicate that pasture was a relatively cheap feed.

The price received by farmers for milk should bear a close relationship to the cost of production at different seasons in order to insure a year-round supply. Otherwise, farmers will so adjust production that the bulk of the milk will be produced at the time of year when costs are lowest.

The year is the production cycle of a cow. Even the milk is produced at a lower cost in summer, yet a cow must be maintained in winter in order to have her for summer production. The farmer's problem in this connection is to determine whether the largest year's profit from the dairy enterprise will be secured by producing most of his milk in summer or in

winter. Table XIX shows the relation of time of freshening to costs, production and profits.

TABLE XIX—RELATION OF FALL AND SPRING FRESHENING TO COSTS, PRODUCTION AND PROFITS

| | Time of freshening | |
|--|--------------------|---------------|
| | Sept. 1-Jan. 1 | Jan. 1-July 1 |
| Number of farms | 24 | 13 |
| Number of cows | 345 | 150 |
| Pounds of milk per cow | 4905 | 3579 |
| Value of milk per cow | \$97.00 | \$70.00 |
| Returns except milk per cow | 15.00 | 15.00 |
| Feed cost per cow | 94.00 | 77.00 |
| Other costs per cow | 74.00 | 63.00 |
| Net cost of milk per cow | 152.00 | 125.00 |
| Loss per cow | 55.00 | 55.00 |
| Feed cost per 100 pounds of milk | 1.92 | 1.96 |
| Total net cost per 100 pounds of milk..... | 3.10 | 3.49 |
| Value per 100 pounds of milk | 1.98 | 1.93 |
| Loss per 100 pounds of milk | \$1.12 | \$1.53 |

All of the cows on 24 farms freshened between September 1 and January 1. All of the cows on 13 farms freshened between January 1 and July 1. Roughly, this classification divides the farms into fall and spring freshening groups. On the remaining 21 farms the cows freshened thruout the year and for this reason are not included in the above table.

Cows on farms practicing winter dairying produced, on an average, 37 percent more milk than those on farms where most of the milk was produced in summer. Probably these cows were naturally better producers. Usually 10 to 15 percent greater production can be expected by having cows freshen in the fall rather than spring. A higher net cost per cow was found on farms where the cows fall-freshened, but due to higher production the average yearly cost per 100 pounds of milk was 39 cents less than on those farms where cows freshened in the spring. The loss per 100 pounds of milk was greater on the latter group of farms, but with smaller production, their loss per cow was no greater than on farms where cows fall-freshened. If the price of milk had been lower, summer production would have had the advantage. If the price had been higher, farms producing winter milk would have fared better than the summer producers. The best time of year to have cows freshen depends on the average yearly price received for milk and the cost of producing it. In this study cows freshening in the fall produced milk more economically and in normal times with a fair price for milk, would have made greater profit than cows freshening in the spring.