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FARM BUSINESS NOTES

Prepared by the Divisions of Agricultural Economics and Agricultural Extension
Paul E. Miller, Director Agricultural Extension

NO. 327 UNIVERSITY FARM, ST. PAUL NOVEMBER 30, 1950

Economic Effects of Artificial Breeding

ROBERT E. OLSON

University Farm Radio Programs

HI-LIGHTS IN HOMEMAKING
10:45 a.m.

UNIVERSITY FARM HOUR—12:30 p.m.

Station KUOM—770 on the dial

The artificial insemination of commercial dairy cows has been carried on in the United States since 1938. Artificial breeding associations now are active in 47 of the 48 states and in the territory of Alaska. It is estimated that nearly three million cows will be bred by this method in 1950.

Producers who adopt the practice expect to profit through an increase in the output of milk per unit of resource input. Consumers of dairy products also will share in the gains through larger supplies and lower prices.

The farmer who artificially breeds his cows benefits immediately in several ways. For many farmers, the cost of artificial service is less than the cost of keeping a bull. The feed, labor, and barn space devoted to keeping a bull are released for other uses. Farmers with small herds and those who live in areas where feed is scarce and expensive enjoy the largest savings on a per cow basis. The usual charges are from five to seven dollars per cow inseminated. A disadvantage is that the costs of artificial breeding are all cash costs. This may influence the decision of some farmers, particularly during periods of declining farm income.

The largest part of the gain comes from improvement in the offspring, which is done gradually over a period of time. If the farmer is not interested in the quality of the progeny, he has the alternative of borrowing or renting a bull or using a young bull which will gain weight. However, most commercial operators who produce milk or cream for sale and raise their own replacements cannot maintain a sire of quality equal to the bulls in service in artificial breeding establishments.

There are possibilities for greatly reducing the number of dairy bulls on farms. On the average, there is one bull for every twenty cows on farms in the United States. The number of cows inseminated per bull in artificial breeding associations has increased greatly through the years. In 1939, 229 cows were enrolled per bull and by January, 1950, this figure had increased to 1,344. The increase was made possible by improved techniques in the handling of semen and the growth of the volume of business per bull stud. It is likely that the number of cows served per bull can be increased further. Some associations now average as high as 3,500 cows bred per year per bull in service. Semen dilution rates exceeding those in commercial use have been found feasible. It is possible to ship semen great distances by air, bus, and train. The trend is toward a larger number of cows served per stud. At least eight organizations approach or exceed the 100,000 cows per year mark. The larger organizations inseminate more cows per bull than the smaller ones. The semen is distributed by sale to local cooperatives, to technicians who are employees of the central organization, or independent technicians.

The reduction in the number of bulls on farms will reduce the number of bulls available for slaughter and will increase the number of veal calves and steers marketed. If the artificial breeding program continues to expand, the effect on meat supplies will be important.

The most important result of artificial breeding is the improvement in the genetic makeup of the nation's dairy herds. The mating of ordinary commercial dairy cows with proven sires by artificial means makes possible increases in production of the individual cow. Data to show the magnitude of this effect are lacking. Only one cow in 50 has Dairy Herd Improvement Association production records, and the cows tested produce more than the typical cow. The cows tested in DHIA during 1949 averaged 359 pounds of butterfat per year (305 days). The average for all cows is 209 pounds. The difference is due to a number of factors of which inherent productivity is but one. The average production of the daughters of sires in service in artificial breeding establishments is 436 pounds of butterfat per year.[1] Evidence is also accumulating on the performance of the artificially sired daughters of these sires in a large number of farm herds. These daughters show small but significant increases at the 400-pound level. The in-

[1] Of the bulls 760 or 36 per cent have five or more daughters with production records.

Table 1. Number and Proportion of Dairy Cows Bred Artificially, United States, 1939-1950

Year	Number of cows bred artificially*	Proportion of cows and heifers kept for milk, January 1
		per cent
1939	7,539	.03
1940	33,977	.14
1941	70,751	.28
1942	112,788	.43
1943	182,524	.67
1944	218,070	.79
1945	360,732	1.30
1946	537,376	2.17
1947	1,184,168	4.31
1948	1,713,581	6.96
1949	2,091,175	9.88
1950	2,800,000†	11.50†

* Source: Bureau of Dairy Industry, U.S.D.A.

† Estimated on basis of number of cows enrolled, January 1, 1950.

Table 2. Regional Differences in Artificial Breeding

	All dairy cows Jan. 1, 1949, thousand head	Dairy cows artificially bred 1949, thousand head	Proportion of cows artificially bred, 1949, per cent	Proportion of cows artificially bred, estimated 1950, per cent	Acres in farm per cow	Production per cow, 1949, pounds butterfat
North Atlantic	3,356	500	14.9	20.0	14.5	241
East North Central	6,253	815	13.0	16.1	18.5	233
West North Central	5,578	414	7.4	9.5	50.7	196
South Atlantic	2,052	111	5.4	8.8	47.1	189
South Central	4,865	156	3.2	6.3	57.8	154
Western	2,312	94	4.1	5.1	136.7	254
United States	24,416	2,090	8.6	11.5	.....	208.5

crease of the daughter's production over the dam's increases as the production level declines.

The improvement in production takes place rapidly in terms of generations. The largest increase is in the first generation and the major part takes place within three generations. However, progress is slow in terms of years.

The use of artificial breeding is one of the factors involved in the steady increase in milk output per cow. However, the impact of the artificial breeding program on the aggregate production of milk and on the prices of milk and dairy products has been modest up to the present. Although eleven and one-half per cent of all dairy cows are now artificially bred, only about three per cent of the cows and heifers now in production are artificially sired daughters. The number of cows and heifers inseminated has increased steadily since the beginning of the program (table 1).

Not until 1945 did the number bred amount to as much as one per cent of the dairy cow population. Effects on production of the present breeding program will not be noticed for several years. By 1953, it is likely that nearly 10 per cent of the cows in production will be offspring of sires in artificial breeding associations. A small number of cows are now being mated artificially to bulls of the beef breeds.

The combined effects of the artificial breeding program point in the direction of increased production and lower prices. This will put pressure on the farmer and the regions which are unable or unwilling to adopt the technique. This tendency will be offset in part at least by projected growth in population which will increase the requirements for milk and dairy products.

The extent of artificial breeding varies considerably by regions. The largest proportion of cows artificially bred is found in the North Atlantic and East North Central States (table 2). These two groups of states accounted for over 60 per cent of the cows artificially bred but had only 41 per cent of all dairy cows.

Except in the Western region, the proportion of cows artificially bred is highest in the areas which already have a higher than average output per cow. If this pattern prevails, it is to be expected that genetic improvement due to artificial breeding will tend to increase the differences in output per cow among the regions. This will affect the competitive position of the producers in the various regions.

In the West North Central region, the number of dairy cows has been declining due to a decline in the demand for certain manufactured dairy products and competition for resources from other farm enterprises. The competitive position of producers in this area may be weakened further in relation to producers in other areas where a larger proportion of cows are bred artificially.

Artificially bred heifers sell at premium prices locally and there is an active demand for such animals. If all dairy cow replacements were to come from this source, nearly two thirds of all dairy cows would need to be bred artificially to obtain the necessary number of heifers to meet the present requirements for replacements.

Creamery Costs Are Still Up

JOHN T. BUCK

Creamery operating costs have doubled during the past 10 years. In 1940, the average cost of manufacturing a pound of butter was approximately 2.5 cents. By 1944, the cost per pound of butter made had risen to over 3.0 cents. In 1947, it was approximately 4.6 cents. Further increases in operating costs occurred in 1948 to bring the average cost per pound of butter made to approximately 5.0 cents. Costs in 1949 and 1950 were at least as high as those in 1948.

A large share of the increase in average operating costs can be traced to the shift to whole milk operation which required additional labor and increased investment in buildings and equipment. Comparison of the 1940 and 1947 operating statements of 53 Minnesota creameries which shifted to whole milk operation during the period, 1941-1947, shows that the average cost of manufacturing a pound of butter rose from 2.321 cents in 1940 to 5.124 cents in 1948. Similar costs in the 38 creameries which did not shift to whole milk operation rose from 2.281 cents per pound in 1940 to 4.251 cents in 1948. Costs increased 2.2

times in the creameries which shifted to whole milk compared to about 1.9 times for those remaining in cream operation. Costs of 12 plants already in whole milk operation in 1940 rose about 70 per cent during the period or from 2.914 cents per pound in 1940 to 4.879 cents per pound of butter made in 1948.

In general, operating costs in 1948 were about 10 per cent above those for 1947 (table 1). The largest increase in total operating costs occurred in general and administrative expenses and in interest on loans. Outlays in 1948 for general and administrative expenses such as office salaries, office supplies, auditing, advertising, and other "overhead" expenses were up 14 per cent and 19 per cent respectively over 1947 in the cream and whole milk creameries. Interest on loans in the whole milk creameries showed a sharp increase in 1948 compared to 1947, but no change was observed in the cream plants.

Since operating costs are still at a high level, the need for even more careful control of expenses is urgent. Study of the business operations of the individual creamery by boards of directors and creamery managers will reveal opportunities, in many cases, for substantial reductions in cost. Expansion of the volume of business offers the greatest opportunity for reduction of costs and improving net returns to patrons. In some cases, consolidation of plants in order to obtain a larger volume of business for more efficient operation would be in the interest of all patrons.

Table 1. Operating Costs of 103 Minnesota Creameries, 1940, 1947, and 1948

Year	Proportion of butterfat bought as whole milk (per cent)	Ave. volume of butterfat handled per plant (pounds)	Proportion of butterfat churned into butter (per cent)	Operating costs per pound of butter made* (cents)
		38 Cream creameries		
1940	.....	293,491	99.8	2.281
1947	.....	247,400	98.6	3.854
1948	.....	249,184	99.1	4.251
Per cent change, 1947-48	.....	+0.7	.....	+10.3
		65 Whole milk creameries		
1940	5.8	384,551	98.8	2,436
1947	63.3	455,951	74.5	4.542
1948	58.0	429,633	77.4	5.070
Per cent change, 1947-48	.....	−5.8	.....	+11.6

* In calculating per unit costs, the pounds of butter made were adjusted to include the amount of butter which would have been made from butterfat sold as whole milk or cream.

Arranging the Dairy Barn For Efficient Work

S. A. Engene

Many farmers ask us: "Should cows in a dairy barn face in or out? Which will require the least labor?" A recent study of work in dairy barns shows little difference in time for chores.[1] Other factors are more important in deciding upon the arrangement of the barn.

[1] From a study conducted by H. W. Ottoson, former research assistant at the University of Minnesota.

Man Hours per Year Needed to Perform Major Chore Jobs on Dairy Herds*

	With cows facing in		With cows facing out	
	One row of stalls	Two rows of stalls	One row of stalls	Two rows of stalls
	10-cow herd			
One cross alley at end	657	673	679	672
One cross alley, in center	662	681	673	665
Two cross alleys, at ends	655	664	663	660
	25-cow herd			
One cross alley, at end	1,641	1,682	1,699	1,652
One cross alley, in center	1,638	1,645	1,698	1,647
Two cross alleys, at ends	1,640	1,629	1,672	1,625

* The data in the table are estimates of the time needed.

Typical chore routines and the average time needed for various jobs were determined from detailed time records for a group of dairymen. These average times were then used to calculate labor requirements for different arrangements of barns. Only the chore jobs that will be affected by the stall arrangement are included. Also, all estimates are based upon fairly efficient working methods and speeds. Time records covering all dairy chore jobs done with average efficiencies usually show time requirements twice as high as those shown in the table.

With a small dairy herd, the labor requirement is lowest when the cows are in one row, facing in, but the difference is not large. The feed alley will then be between the cows and the pens for calves and young stock. The milk room can be located outside the wall behind the cows, with easy access to the litter alley. If the stalls are in two rows at one end of the barn, labor requirements are slightly lower when the cows face out than when they face in.

With a dairy herd of 25 cows, labor requirements in a barn with the cows in one row facing in will be about the same as in a barn with the cows in two rows facing out. If the stalls are in two rows, there is an advantage in favor of having the cows face out, but it is not large.

Some labor can be saved by having two cross alleys rather than one. This enables the worker to take shorter routes, and to make circular trips. About 10 hours a year can be saved with a 10-cow herd and 25 hours with a 25-cow herd. An extra cross alley, however, will mean building the barn two to four feet longer. At present prices, an extra four feet will cost from $300 to $400. That is an extra annual cost of $20 to $30. The extra cross alley will not be profitable for most small herds.

The arrangement of the stalls and cross alleys seems to be a relatively minor consideration in planning a dairy barn. These must be considered along with many other factors, such as locations of silo room, milk room, chores, gates, and hay chutes. Careful planning of all details is necessary. An aid to careful planning is to make drawings, to scale, of arrangements that seem desirable. Then carefully review all travel routes that will be used. Trace the travel for an entire day's work. Trace the travel with thread, holding the thread in place with pins stuck through the drawing into a soft board. Study the travel routes, especially the long ones or those where a large number of strings indicates many trips. Rearrangements may be possible to cut down travel and time.

Minnesota Farm Prices for September-October 1950

Prepared by W. C. Waite and A. B. Larson

The index number of Minnesota farm prices for September, 1950, is 239.0. For October, the index is 244.9. This index expresses the average of the increases and decreases in farm product prices in the given month of 1950 over the average of the corresponding month 1935-39, weighted according to their relative importance.

Average Farm Prices Used in Computing the Minnesota Farm Price Index, September-October, 1950, with Comparisons*

	Sept. 15, 1950	Oct. 15, 1950	Oct. 15, 1949		Sept. 15, 1950	Oct. 15, 1950	Oct. 15, 1949
Wheat	$ 2.07	$ 1.95	$ 2.01	Hogs	$20.60	$19.20	$17.70
Corn	1.33	1.29	.99	Cattle	25.30	25.30	20.40
Oats	.67	.67	.55	Calves	29.10	28.70	24.20
Barley	1.31	1.26	1.25	Lambs-sheep	24.00	24.75	20.02
Rye	1.22	1.18	1.25	Chickens	.187	.168	.178
Flax	3.29	2.99	3.47	Eggs	.332	.365	.440
Potatoes	1.15	.85	1.10	Butterfat	.66	.69	.68
Hay	14.90	14.10	14.56	Milk	3.20	3.35	3.25
				Wool†	.55	.55	.43

* These are the average prices for Minnesota as reported by the United States Department of Agriculture.

† Not included in the price index number.

The index of prices paid for commodities bought by farmers has risen to within one point of the record high of July, 1948. The index has been increasing since October, 1949, and there are strong indications that this trend will continue.

Prices received by farmers have advanced at a much greater rate in recent months than have prices paid, but the index of prices received is still 10 per cent below the record high.

Indexes and Ratios for Minnesota Agriculture*

	Sept. 15, 1950	Average Sept., 1935-39	Oct. 15, 1950	Average Oct., 1935-39
U. S. farm price index	253.7	100	252.3	100
Minnesota farm price index	239.0	100	244.9	100
Minn. crop price index	227.4	100	219.8	100
Minn. livestock price index	284.8	100	287.2	100
Minn. livestock product price index	197.7	100	196.6	100
U. S. purchasing power of farm products	122.3	100	120.6	100
Minn. purchasing power of farm products	115.2	100	117.1	100
Minn. farmers' share of consumers' food dollar	57.7†	48.6	60.5‡	47.6
U. S. hog-corn ratio	14.6	12.6	14.0	14.1
Minnesota hog-corn ratio	15.5	14.9	14.9	17.8
Minnesota beef-corn ratio	19.0	11.9	19.6	14.7
Minnesota egg-grain ratio	12.1	17.3	13.8	20.9
Minnesota butterfat-farm-grain ratio	29.7	32.4	30.3	36.4

* Explanation of the computation of these data may be had upon request.

† Figure for June, 1950.

‡ Figure for July, 1950.

UNIVERSITY FARM, ST. PAUL 1, MINNESOTA

Cooperative Extension Work in Agriculture and Home Economics, University of Minnesota, Agricultural Extension Division and United States Department of Agriculture Cooperating, Paul E. Miller, Director. Published in furtherance of Agricultural Extension Acts of May 8 and June 30, 1914.

Sales of Butter and Margarine in Minneapolis Retail Stores

W. C. Waite and A. B. Larson

A survey of Minneapolis retail food stores was conducted by the Division of Agricultural Economics during May and June, 1950. The purpose of the survey was to determine the quantities of butter and margarine sold, the prices of each commodity, and the nature of merchandising practices, such as storage, display, and markup determination, as they related to these two commodities. Some preliminary results of the survey follow.

Total weekly sales of butter were almost three times as great as weekly sales of margarine. Volume of margarine sales was more nearly equal to volume of butter sales in stores reporting sales of both items. Only two stores in the sample sold no butter, whereas 106 or nearly half of the stores sold no margarine.

Butter prices ranged from 57 cents to 79 cents per pound, with an average of 69.3. Animal fat margarine ranged in price from 24 cents to 39 cents, with an average of 28.6 cents per pound. Vegetable fat margarine ranged from 40 cents to 49 cents per pound, with one exception where the price was 35 cents. The average price of vegetable margarine was 42.6 cents per pound.

Dr. Warren C. Waite, 1896-1950

We deeply regret to report the death of Dr. Warren C. Waite, professor of agricultural economics at the University of Minnesota, on November 11 at his home in St. Paul. Dr. Waite's special fields included agricultural prices and income. His contributions have appeared regularly over the years in the *Farm Business Notes*.

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