Our Industry Today

Trends and Needs in the Dairy Industry

Milk—A Basic Food

Milk and dairy products have been among the most favored foods in the American diet. Milk is valued especially as a food for the infant and the young, but it is an equally important food for adults and the elderly. It is a good source of protein of high biological value. It is a principal source of calcium and phosphorus, and it carries important amounts of several of the vitamins, especially vitamin A, thiamin, riboflavin, and vitamin B₁₂.

The annual per capita disappearance of milk on a milk equivalent basis in 1971 was 253 kg. This provided for consumer use about 22% of the protein; 12% of the food energy, fat, and vitamin A; 10% of the thiamin; 42% of the riboflavin; 36% of the phosphorus; and 76% of the calcium in the total available food supply.

In 1961 the per capita disappearance was 291 kg and in 1950 it was 336 kg. Over the past 21 yr, there has been an average decrease in per capita disappearance of 3.9 kg per year. This downward trend appears to be a steady one and has the appearance of continuing. This is cause for concern to the dairy industry, as it is to nutrition authorities who recognize milk as a protective and supplemental food to balance other items for a complete and nutritious diet.

There are many reasons why people are eliminating milk and dairy products from their food purchases. Some of these are (1) a belief that milk and milk products are high in price (on a comparative cost-nutritive value basis this is not true), (2) a belief that the fat in milk and milk products is a factor in heart disease (this is not a substantiated fact), (3) a belief that milk and milk products are fattening, (4) the great increase in varieties of foods in markets, (5) the increase in people eating away from home, and (6) the expanding population.

Building Markets for Milk and Dairy Products

The maintenance and building of markets...
is a first concern for the dairy industry, both
the producer and the handler of milk and milk
products. This industry has a long history of
self-supporting efforts in product, nutritional,
and marketing research; education; and adver-
tising. It deserves the help and support of all
people, for a vital food supply is at stake.
These efforts need to be strengthened and sup-
plemented with continual improvement in the
quality, appeal, and safety of milk and milk
products; the development of new dairy foods
and new uses of milk constituents as adjuncts
to other foods; and continual efforts to keep
the prices for milk and milk products as com-
petitive as possible.

Research Support for Production
Comes from Public Funds

The industry supported research has been
confined to nutrition, product development,
and marketing. The industry has depended on
public supported research institutions (both
Federal and State) and, to some degree, on
private companies for the needed research on
dairy farming. In this respect, this industry is
in direct competition with all other agricultural
commodity groups for the public supported re-
search dollar to furnish the information and
technology to advance and improve the effi-
ciency and profitability of the production en-
terprises.

A Dairy Research Council

It is the duty and job of individuals and
groups within this industry to see that dairying
is fairly treated in the allocation of the public
research dollar for this research support. The
industry not only should increase its voice re-
garding the appropriation and allocation of
funds for dairy production research but also
should concern itself more with how the funds
are used in relation to problems pressing on the
milk producer. There is need within the dairy
industry for a research council made up of rep-
resentatives from the several dairy farming or-
ganizations whose sole duty it would be to
study research needs, to be acquainted with
ongoing public supported research and its
progress, and to represent better both the
needs of the dairy farmer before appropriation
and administration bodies in support of re-
search to advance the efficiency and profita-

Trends in Research Support for Farm Research Divisions in the Agricultural Research Service, USDA

Funding by the Congress and the Adminis-
tration for research support in the former farm
research divisions and branches of the Agricul-
tural Research Service (ARS), USDA, is given
in Fig. 1. The increases from fiscal year 1959
to fiscal year 1972 give an idea of how finan-
cial support for the different commodities has
gone, especially that among the animal species.
This, to a degree, reflects industry interest and
concern, or lack of it, for research support from
the different segments of agriculture. Compar-
ing increases for dairy cattle breeding, feeding,
management, reproduction, and production
factors affecting product quality research be-
tween the years 1966 and 1970 (years where
there is comparative data available), the ARS
fund increases amounted to 5.4% while that
for all State Agricultural Experiment Stations
was 15.5%.

The dairy farming industry is the second
largest agricultural commodity group from the
standpoint of gross farm income. It is impor-
tant in nearly all areas of the country. It is a
major user of land and crop resources, as well

FARM RESEARCH FUNDS

Agricultural Research Service, USDA
Increase from 1959 to 1972

<table>
<thead>
<tr>
<th>Division</th>
<th>1959 to 1972</th>
</tr>
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<tbody>
<tr>
<td>ENTOMOLOGY</td>
<td>381%</td>
</tr>
<tr>
<td>AGRICULTURAL ENGINEERING</td>
<td>271%</td>
</tr>
<tr>
<td>SOIL &amp; WATER</td>
<td>222%</td>
</tr>
<tr>
<td>PLANT SCIENCE</td>
<td>175%</td>
</tr>
<tr>
<td>VETERINARY SCIENCE</td>
<td>171%</td>
</tr>
<tr>
<td>ANIMAL SCIENCE</td>
<td>141%</td>
</tr>
<tr>
<td>Poultry</td>
<td>164%</td>
</tr>
<tr>
<td>Swine</td>
<td>151%</td>
</tr>
<tr>
<td>Sheep</td>
<td>150%</td>
</tr>
<tr>
<td>Beef cattle</td>
<td>133%</td>
</tr>
<tr>
<td>Dairy cattle</td>
<td>80%</td>
</tr>
</tbody>
</table>

Fig. 1. Farm research funds.
as a huge market for the products of the manufacturing and service industries. The processing and disposition of milk and milk products constitutes one of the largest food industries in the country.

The dairy herd is a most important market for the products of the soil produced by dairymen and grain and forage farmers alike. In terms of feed units, the national dairy herd in 1969 consumed 15% of the concentrates and 25% of the forage resources used by all livestock and poultry.

**Trends in Dairy Farming**

To remain competitive and profitable, dairy farming has been undergoing great changes during the last decade or more. Many farmers have gone out of dairying. Herds have become larger, and greater emphasis has been placed on increasing the output of milk per cow, per man hour of work, and per farm. These changes have brought about a whole new set of problems in farm and herd management that demand attention. It is now more important than ever to keep the costs of milk production as low as possible.

The major part of the milk production still comes from the family-type farm, but there is evidence that dairying is moving to even larger, more intensive-type enterprises. Every effort should be made to preserve the family-type farm as the major source of the milk supply. Research objectives should be directed to production of technology that favors the family-type dairy farmer to be more productive, more efficient, and more competitive.

In charting a course for future research and operational needs for dairy farmers, it is useful to look at historical trends of changes taking place over the past two decades. These trends are depicted in Fig. 2 to 6 with 1950 as a base and the 5-yr points as percents of the base year. The data have been drawn from volumes of Agricultural Statistics and related reports of the USDA.

**Trends in Herds and Cow Numbers and Milk Production**

Fig. 2 shows the extent of the downward trend in the numbers of dairy herds, milk cows, and cow replacements and the nearly level output of total milk production. Milk production rose in the late 1950's and the 1960's and by 1970 was about the same as for 1950, in spite of a decrease of almost half the number of milk cows. During these 20 yr, the per capita production of milk steadily decreased by almost one-fourth.

**Increase in Production Per Cow and Feed Inputs**

The high output of milk was sustained, as shown in Fig. 3, by the steady and high increase in the average milk production per cow, 77% above 1950. Several factors were responsible for this increase. One of the most significant was the large increase in feed consumption, an increase of 131% in grain and 28% in forage. The favorable concentrate cost-milk price ratio and abundance of available concentrates favored this trend. The costs per 45 kg of concentrates and the kilograms of concentrates fed per 45 kg of milk produced showed significant increases. This may suggest overfeeding of concentrates. The increase in forage consumption of 28% probably reflects an increase in cow size and a shift to larger breeds. The price farmers receive for milk influences feeding practices also. When prices are good, the tendency is to feed more liberally.

**Trends in Milk Prices**

Average prices received for milk—(1) wholesale price per 45 kg for all milk, (2) milk for bottling use, and (3) manufacturing grade—are in Fig. 4. There was a gradual increase from 1950 to 1965, with that used for bottling
OUR INDUSTRY TODAY

% OF 1950

- CONCENTRATES FED/COW/YEAR
- PRODUCTION/COW
- CONCENTRATES FED/100 LB. MILK PRODUCED
- FORAGE FED/COW
- CONCENTRATE-FEED PRICE RATIO
- COST/TON, ALFALFA HAY
- COST/100 LB. CONCENTRATES
  'EQUIVALENT

1950 1960 1970

Fig. 3. Trends in feed inputs and milk output relationships.

% OF 1950

- FARM VALUE OF MILK
- PRICE, MFG. GRADE MILK
- PRICE, ALL MILK
- PRICE, BOTTLING MILK

1950 1960 1970

Fig. 4. Trends in milk prices and income.

Studies made by the Economic Research Service, USDA, on costs and returns of synthesized representative 40-cow dairy farms in southern Wisconsin give information on the total cost-returns of dairy farm operations. Some of the data reported for 1965 and 1971 are summarized in Table 1.

Gross and net farm income showed increases of 50 and 68%, respectively. Total farm expenses increased by 32% and returns to the operator and family increased by 36%. When returns to the operator and family are related to farm capital, gross income, and net income, a decrease of 8 to 9% occurred while an increase of 3% occurred relative to total farm expenses.

Costs and Returns from Increased Production
and Feed Inputs with Dairy Herd Improvement
Association (DHIA) Cows

The relative input-output relationships may be looked at in another way. This is from DHIA data for individual cows. The trends for production per cow, total feed costs, returns over feed costs, feed costs per 45 kg of milk, and the dollar returns per dollar of feed costs are in Fig. 5. The data are for cows in herds that averaged about 5,742 kg of milk per year. The important item in these trends is the decrease between 1950 and 1970 in the dollars returned per dollar of feed cost of 32%. This suggests with current prices and major increases in feeding, particularly concentrates, and resulting increase in production, the dollar returns from feed are significantly less. This may indicate a loss in overall efficiency even though returns over feed costs increase signifi-

Labor Efficiency Improved

Important efficiencies have occurred in the man hours of labor used in the production of milk. Man hours of labor per cow and per 45 kg of milk produced in 1950 were 125.3 and 2.36 h and in 1970, 67.9 and .72 h.

Trends in Costs and Returns

What impact have these changes had on the welfare of the farmer and the profitability of his enterprise? It is difficult to translate national trends into their impact on the individual farmer. There also are many other factors relating to inputs that are not included in this discussion.
cantly.

These data concern only feed costs related to milk yield per cow and value of the product. Other costs such as labor, etc., are not included. It does raise the question, however, as to whether farmers are overfeeding, especially on concentrates, in terms of costs and returns. At the same time, higher producing cows, presumably in genetically superior and well-managed herds, appear to be more efficient than low producing cows. As an example, in 1970-71, Holstein-Friesian cows in herds that averaged 7,212 kg per year gave a dollar return per dollar of feed cost of $1.88 while cows in herds averaging 5,443 kg returned $1.68. The kilograms of milk produced per kilogram of concentrates fed were essentially the same.

The availability of an abundant low-cost feed supply in relation to value of milk has been capitalized on by dairy farmers to increase milk production. The amount to feed in relation to genetic ability and management capability to maximize net returns to the operator is much less clear. There also is evidence that some cows may be reaching the physiological limits in handling large quantities of concentrates in relation to the amount of forage they receive in their rations.

The opportunity to upgrade and make greater use of farm forage supplies to hold down costs and improve overall dairy farm production efficiency remains great. Someone said that if farmers are going to use pasture and forages as a crop, they should treat it as a crop, as they do corn and other grain crops. This is true and should be given greater attention, particularly from the standpoint of management and utilization.

**Participation in National Improvement Programs**

Two of the national dairy programs that have contributed greatly to the trends in dairy development over the past two decades are (1) the National Dairy Herd Improvement (NDHI) and the accompanying National Sire and Cow Evaluation Program and (2) artificial insemination (AI). The former has helped participating members become better dairymen and has provided the information to identify superior breeding stock. The latter has helped in distributing the influence of the superior transmitting bulls over larger cow population. AI has had other beneficial effects, in-

**TABLE 1. Analysis of costs and returns on synthesized representative 40-cow dairy farms in southern Wisconsin, 1965 and 1971.**

<table>
<thead>
<tr>
<th>Item</th>
<th>1965</th>
<th>1971</th>
<th>Percent change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total farm capital</td>
<td>$85,260</td>
<td>$135,435</td>
<td>+59</td>
</tr>
<tr>
<td>Gross farm income, all sources</td>
<td>$24,368</td>
<td>$36,286</td>
<td>+50</td>
</tr>
<tr>
<td>Total farm expense</td>
<td>$12,316</td>
<td>$16,224</td>
<td>+32</td>
</tr>
<tr>
<td>Net farm income</td>
<td>$11,952</td>
<td>$20,062</td>
<td>+68</td>
</tr>
<tr>
<td>Return to operator for labor</td>
<td>$7,262</td>
<td>$9,904</td>
<td>+36</td>
</tr>
<tr>
<td>and management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return to operator as percent</td>
<td>8.5</td>
<td>7.5</td>
<td>- 8</td>
</tr>
<tr>
<td>of farm capital</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return to operator as percent</td>
<td>29.9</td>
<td>27.3</td>
<td>- 9</td>
</tr>
<tr>
<td>of gross income</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return to operator as percent</td>
<td>60.8</td>
<td>49.4</td>
<td>-19</td>
</tr>
<tr>
<td>of net income</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return to operator as percent</td>
<td>59.0</td>
<td>61.0</td>
<td>+ 3</td>
</tr>
<tr>
<td>of total farm expenses</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 Includes returns to family labor.

2 After allowing for return on investment at current interest rates in the area which increased 8% 1965 to 1971.

**FIG. 5. Trends in milk production, feed costs, and returns per cow in Dairy Herd Improvement Association (DHIA) herds.**
CLUDING elimination of the need for dairymen to keep bulls on the farm.

Trends in the development and use of these two programs are shown in Fig. 6. Both programs were well established by 1950, and both have shown continuing growth. However, because of consolidations and reduction in numbers of dairy herds, the numbers of DHI associations and AI organizations have decreased. In 1950, 1.1 million cows or 4.9% of all dairy cows were in testing programs. In 1970, 2.2 million cows or 24.8% were in testing programs. Continuous production testing does pay. Recent studies by Cornell University show that in a 50-cow herd the net income per cow, after testing fees have been paid and after 6 yr of continuous testing, should be $14.33 per cow higher with herds on official DHIA than for herds not on test. They suggest that it is important for farmers to start testing and continue with the program to realize the greatest benefit. They further indicate that benefits from continuous testing are greater for farmers with larger herds than smaller herds. It is pitiful that at this time so few dairy farmers participate in this important activity.

In 1950, 2.6 million cows or 9.7% of all dairy cows and heifers of breeding age were AI bred while in 1970, 7.3 million cows or 46.3% were AI bred. The objectives of both programs should be to increase steadily the participation for the benefit of the participating dairymen. Complementing and adding to these important improvement programs are those of the individual purebred dairy breed association, the Purebred Dairy Cattle Association, and the Dairy Herd Improvement Association, Inc., whose efforts individually and collectively have contributed greatly to progress and whose efforts will have even greater impact in the future. This activity along with the strong marketing and information organizations in the dairy industry are in a good position to serve effectively milk producers of this country.

**Some Research Needs to Aid the Dairy Farmer**

Dairy farmers require and need technology and information to increase their abilities to produce milk more profitably, efficiently, and competitively. This technology and information must come largely from public supported research institutions. Examination of these needs indicates that expanded research should be undertaken to produce new information on the following problems:

1) Improve herd management systems and practices, especially for large herd and for family-type dairy farm operations.

2) Improve milking management operations, including the machine and its performance, and the handling and maintenance of milk on the farm.

3) Develop management and other techniques that will avoid or reduce the incidence of mastitis and numbers of leukocytes in milk.

4) Develop practical and useful automated data recording procedures for feeding, milk recording, reproduction, etc., to aid in farm and herd management decisions.

5) Improve techniques and procedures for obtaining more useful information for the DHI program.
6) Develop more efficient, low-cost housing and feed and waste storage and handling facilities for dairy herds of various sizes.

7) Breed strains of dairy cattle better able to perform comfortably at high levels under large herd, intensive management.

8) Improve the reproduction performance and reproduction rate of dairy cattle (to get cows back in calf sooner after parturition, etc.).

9) Reduce losses in nutrient yield and quality to increase the contribution of home-produced harvested forages to the feed supply.

10) Increase the yield of more adaptable high protein-energy containing strains of grasses and legumes.

11) Reduce the time and labor involved in conserving and handling forage from the standing crop to the manger.

12) Develop improved strains of grasses and legumes more suitable for dairy feed.

13) Develop soil management practices that promote high yielding forage and feed crops.

14) Increase the acceptability, digestibility, and utilization of the harvested forage crop.

15) Improve pasture development and pasture-herd management systems to increase contribution of pasturage to the feed supply.

16) Evaluate the feasibility of alternatives to pasturing dairy cattle.

17) Improve the overall feed input and milk output relationship.

18) Develop feeding and management systems for surplus dairy cows and their offspring for meat production.

19) Develop procedures that will assure the quality and safety of milk, free from contaminants and residues, etc., from materials used in production.

20) Develop strains of dairy cattle that yield higher amounts of solids-not-fat and protein in relation to butterfat.

21) Develop through selection and feeding practices cows that produce milk containing higher percentages of unsaturated fatty acids.

22) Breed strains of dairy cattle that can utilize more efficiently greater amounts of forage.

23) Develop practical and efficient ways of handling and safely disposing of dairy farm waste and dairy cattle manure. (Approaches include storage, land distribution, biodegradation, recycling, etc.)

24) Determine pollution effects of animal and crop residue waste disposal to surrounding environment.

25) Determine the behavior traits of cow herds as an aid to management improvement.

**BOOK REVIEW**

Dairy Cattle Science by M. E. Ensminger, published in 1971 by The Interstate Printers and Publishers, Danville, Illinois, is an expansion of the dairy science information contained in the parent book, Animal Science, now in its sixth edition. The book contains a vast amount of useful facts, figures, thumb-rules, and guidelines for dairymen but is severely lacking in information concerning many contemporary practices in dairy science. For example, three chapters are devoted to the methodology of management, harvesting, and utilizing and storing pasture, hay, and silage crops; but no mention is made of combining forages and concentrates into complete feeds. In another instance, the chapters dealing with breeds, selection, and genetics do not contain information on predicted differences for milk or type and, furthermore, suggest that progeny testing should be used to supplement but not replace selection on individual merit or pedigree. The book appears to have been written with the author’s training and experiences as the major source of information since many sections and recommendations are outdated and not relevant to the needs of today’s dairyman. Nevertheless, the book contains much information the dairymen occasionally needs, and it can readily serve as a useful handbook. Although the book has possibilities for use as a dairymen’s handbook, it has limited usefulness as a textbook for a course in dairy science. Basically, it is poorly organized for class use and it would be difficult for the beginning student to differentiate between the important and relevant topics and lesser topics which receive equal or greater coverage. There is a paucity of information on such topics as reproductive physiology and lactation as well as other important areas, and it appears inadequate as a modern textbook for dairy cattle science.

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