Impact of

Dairy Improvement

on milk produc

If milk prices had increased in proportion to wages since 1950, California consumers would have been paying 57 per cent more than the prevailing prices in 1968—or about 75 cents per half-gallon in Los Angeles and 82 cents in San Francisco. The consumer's milk bill in California would have totaled almost $330,000,000 more, based on the 2.3 billion quarts of fluid milk bought in 1968. This savings is a direct result of increased production and efficiency, attributable in large part to improved record keeping and management techniques developed in herds of Dairy Herd Improvement Association members. Average production per cow on DHIA test in 1968 was 13,536 lbs, as compared with 9,767 lbs for those not in the DHIA program (a 39 per cent increase). The total milk supply in California has increased approximately 50 per cent since 1950 with only a slight increase in cow numbers. About half of the cows in the state are now on DHIA test and these cows produce about 58 per cent of the state's fluid milk.

C. L. PELISSIER

DAIRY HERD IMPROVEMENT ASSOCIATIONS (DHIA) are self-supporting, non-profit cooperative associations organized and operated by dairymen. The University of California Agricultural Extension Service, the Federal Agricultural Extension Service and the Agricultural Research Service of the U. S. Department of Agriculture cooperate in California's DHIA program. The object of DHIA is to provide participating dairymen, and research and extension workers the tools needed to improve the efficiency of milk production. How well DHIA has accomplished its objective and the impact it has had on California's milk production efficiency is summarized in table 1 and is discussed in this study.

Statistics

Milk statistics for 1968 showed that cows on test in DHIA produced 3,769 lbs (39 per cent) more than their counterparts not on test. DHIA cows showed an even greater advantage in butterfat production: 172 lbs, per cow, or 51 per cent more. The percentage difference between milk and butterfat advantage indicates that herds not on DHIA have a large number of cows producing milk of low fat content who remained undetected because of the lack of DHIA data.

It is not possible to convert the production advantage of DHIA herds into precise economic terms because of the extreme variation in cost of milk production between all herds. However, a practical evaluation of DHIA can be made on a monetary basis by employing some general factors and average figures.

The average price California dairymen received for milk in 1968 was $5.01 per hundredweight (CWT). When this basic price was adjusted to the butterfat percentage, milk from DHIA herds returned approximately $5.10/CWT as compared with $4.84/CWT for milk from herds not on DHIA. Applying these prices to the production figures for 1968, cows on DHIA grossed $690 per cow, as compared with $472 gross income for milk for cows not on DHIA—a difference of $218 in gross milk income. Because there were 382,940 cows on test as of January 1, 1968, DHIA cows grossed approximately $83.3 million more than the cows not on DHIA.

This additional milk income was not all profit because high producing cows eat more feed. There are no studies comparing labor cost per cow in DHIA herds to herds not on test. However, labor studies have shown that production level is a major factor contributing to labor efficiency For example, high producing cows may take a bit longer to milk, but not in proportion to their milk production. As they eat more feed, feeding labor may also be a trifle higher. It is unlikely, however that DHIA cows require more than 10 per cent additional labor. Feed and labor constitute approximately 70 per cent of the cost of milk production. The remaining cost items such as buildings and equipment costs, depreciation, interest on investments, taxes and fees are influenced more by cow numbers than by production level. If there is a difference, most factors would favor the cows producing at a higher level.

The $217 additional gross income of cows on DHIA was achieved at an additional cost of approximately $71, if the best available standards and cost estimates are applied, leaving a net advantage for DHIA of $147. If this figure is projected to all cows on DHIA as of January 1, 1968 (382,940) the net advantage of DHIA cows totaled $56.3 million for 1968.

It should not be assumed from these data that all DHIA herds are profitable and all the other herds are not. Nor do the data mean that DHIA herds averaged $147 profit per cow annually. This figure only indicates the advantages of DHIA herds in their effort to make a profit. Production level is not the only factor that determines management efficiency but it is a major one. Commercial dairy herds dropped in number from 19,428 in 1960 to 5,190 in 1968—indicating the economic stress under which milk producers have operated. The number of herds in DHIA dropped 36.8 per cent in contrast with the 80 per cent reduction in the number of herds not in DHIA during this 18-year period.

Indirect benefits

While DHIA members are the only dairymen who benefit directly from DHIA activities, all dairymen can share the indirect benefits. Research scientists

Herd Association

tion efficiency

F. D. MURRILL

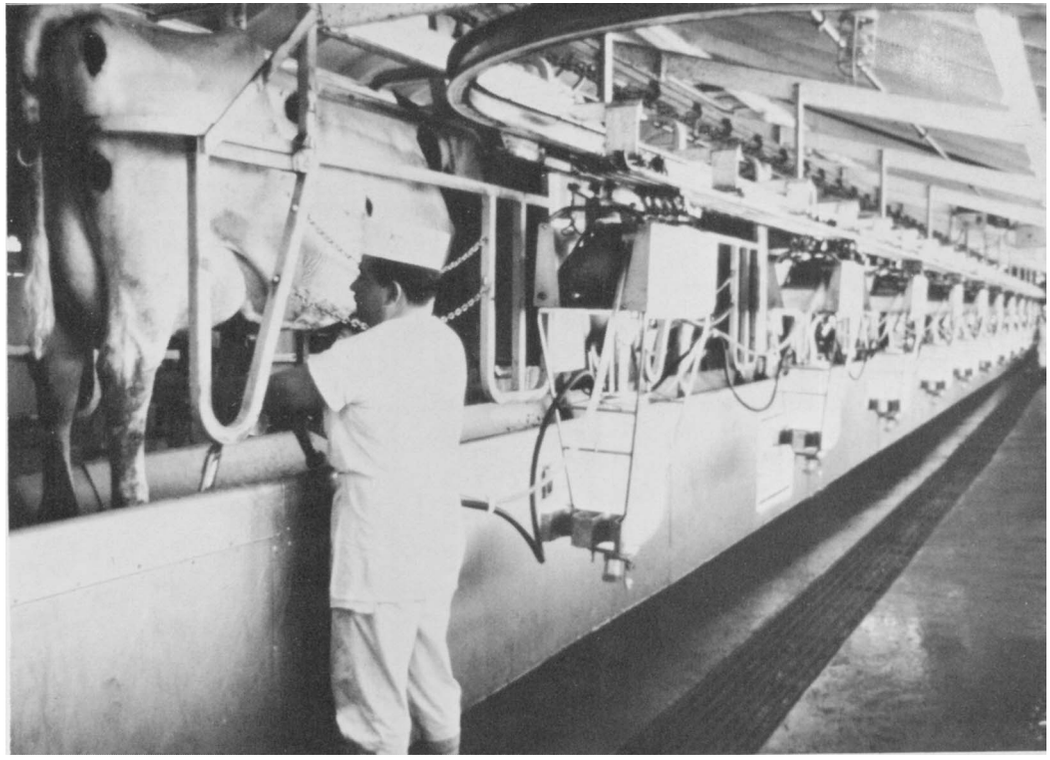


TABLE 1. DAIRY STATISTICS—ALL HERDS, DHIA HERDS, HERDS NOT IN DHIA

All herds	1968	1960	1950	1940	1930	1920
Ave. number milk cows	781,000	824,000	770,000	705,000	611,000	522,500
Commercial herds	5,190	9,764	19,428	26,483	30,546	29,000
Total milk production (million lbs)	8,950	8,059	5,991	4,893	4,002	2,408
Total fat production (million lbs)	322	298	234	188	152	95.6
Butterfat percentage	3.60	3.69	3.91	3.85	3.80	3.97
Cash receipts ($ million)	470.3	380.6	237.0	91.5	90.1	
Ave. milk prod./cow (lbs)	11,460	9,780	7,710	6,940	6,550	4,610
Ave. fat prod./cow (lbs)	413	362	301	267	249	183
Ave. herd size (cows)	137	84	40	27	20	18
DHIA						
Cows on test, Jan. 1	382,940	309,868	200,782	90,021	78,725	26,123
Percent on DHIA	49.0	37.6	25.8	13.0	12.9	5.0
Herds on DHIA, Jan. 1	1,900	2,471	3,005	1,479	1,704	718
Ave. milk prod./cow (lbs)	13,536	11,956	10,101	8,641	8,464	
Ave. fat prod./cow (lbs)	507	460	415	361	330	
Butterfat percentage	3.7	3.8	4.1	4.2	3.9	
Ave. herd size (cows)	202	125	67	61	46	36
DHIA organizations	30	33	35	41	33	18
Herds not DHIA						
Number of cows	398,060	514,132	569,218	614,979	532,275	496,377
Percentage of all cows	51.0	62.4	74.2	87.0	87.1	95.0
Herds	3,290	7,293	16,423	25,004	28,842	28,282
Ave. milk prod./cow (lbs)	9,767	8,680	7,080	6,725	6,346	
Ave. fat prod./cow (lbs)	335	311	270	254	240	
Butterfat percentage	3.4	3.6	3.8	3.8	3.8	
Ave. herd size	121	70	35	25	18	18
DHIA advantage						
Additional milk prod./cow (lbs)	3,769	3,276	3,021	1,916	2,118	
Additional milk prod./cow (%)	39	39	43	28	33	
Additional fat prod./cow (lbs)	172	149	145	107	90	
Additional fat prod./cow (%)	51	48	54	42	38	

TABLE 2. MILK PURCHASED BY HOURLY EARNINGS IN MANUFACTURING INDUSTRIES

Year	Store price of milk (cents/half-gallon)		Average hourly earnings (dollars)		Milk purchased by hourly earnings (quarts)	
	Los Angeles	San Francisco	Los Angeles	San Francisco	Los Angeles	San Francisco
1940	17.5	20.0	.74	.82	6.98	7.32
1950	36.0	37.0	1.62	1.71	9.00	9.45
1960	44.5	47.6	2.59	2.79	11.36	11.58
1968	49.2	50.4	3.37	3.79	13.70	15.04

and agricultural extension workers rely heavily on DHIA for the development of information—and this information is available to everyone. The sire evaluation program, national in scope, depends entirely on DHIA records for sire evaluation. Artificial breeding organizations depend heavily on this program for sire selection and their sires are available to all dairymen. Purebred breeders who supply almost all of the bulls used for natural service also depend heavily on the sire evaluation program. Many of the management practices and techniques developed in DHIA herds soon find their way into other herds and soon become standard practice.

Good indications

DHIA herds are good indicators of dairy trends, even though DHIA production is significantly higher. These trends provide critical information for planning ahead, an important business management function. The rapid increase in herd size and decrease in herd numbers are examples of such trends.

Consumers reap benefit

Consumers benefit signficantly from DHIA. The gain in milk production efficiency through the years has held milk price increases at a minimum and far below the price increases of other commodities and services. Few of the increases in retail milk prices that have resulted since 1950 reflected a price increase at the producer level. Table 2 shows that the

amount of milk the average hourly earnings in manufacturing industries could purchase has more than doubled since 1940.

Milk prices

If milk prices had increased in proportion to wages, the 1968 price of a half-gallon carton of milk would have been 74.9 cents in Los Angeles and 82.0 cents in San Francisco—aproximately 57 per cent above prevailing prices in 1950. Nearly 2.3 billion quarts of milk were consumed in California during 1968, meaning the consumer's milk bill would have totaled almost $330 million more. This saving to consumers excludes the savings on concentrated milk, fluid skim milk, cream products, butter, cheese, and other processed dairy products which are more difficult to calculate.

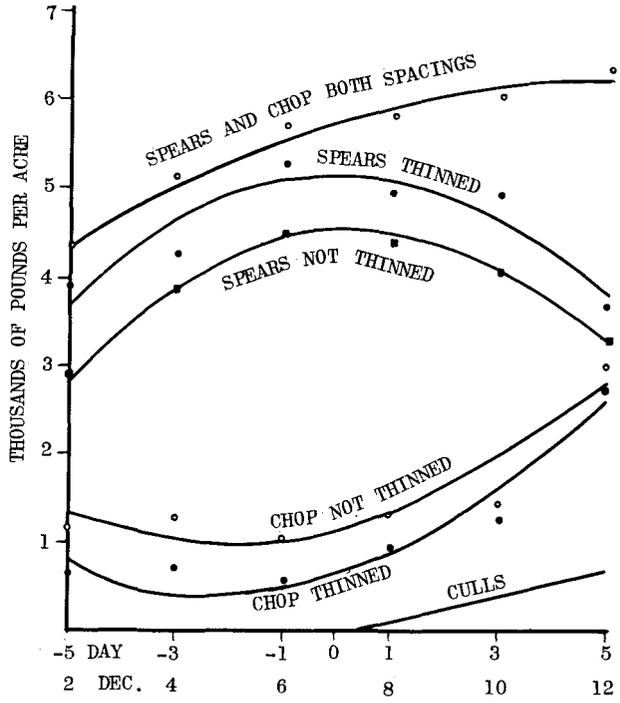
First DHIA

The first DHIA was established in Humboldt County in 1909 under the name of the Ferndale Cow Testing Association with eight members and 581 cows. This association is still in operation and is the oldest in the U. S. in terms of continuous operation. The DHIA movement was given considerable impetus during the 20's by a campaign organized by the Agricultural Extension Service with the Farm Bureau, banks, the press and many other agricultural groups and allied industries participating. Since 1950, however, the growth of DHIA has been due mainly to the recognition of the importance of individual cow records to dairy management.

As shown in table 1, the impact of DHIA on the dairy industry has increased significantly through the years. From a modest 5 per cent of the state's cow population in 1920 the number of cows on test in DHIA increased to 49 per cent in 1968—and these cows produced almost 58 per cent of the state's milk. This expanding influence of DHIA was a major factor contributing to the spectacular increase in milk production per cow since 1950. The increase during this 18-year period was more than three times the increase of the previous 20 years. This also explains, to a large degree, why the total milk supply in California increased approximately 50 per cent since 1950 with only a slight increase in cow numbers.

C. L. Pelissier and F. D. Murrill are Extension Dairymen, University of California, Davis.

GRAPH 1. YIELD TRENDS FOR ONCE-OVER HARVESTS OF HARVESTER BROCCOLI, FIRST TRIAL



Time of machine

HAND HARVESTING costs run over $85 per acre for a 5,000-lb crop of broccoli for freezing. Mechanical harvesting of this crop, if feasible, could be done at a small fraction of this cost.

To find the best time for mechanical harvesting by determining how yield and quality of broccoli change from day to day, two trials were conducted in Ventura County with the Harvester variety of broccoli late in 1968. The Harvester variety was developed by the Asgrow Seed Company for mechanical harvesting. It matures early and quickly, and its quality is good. Its stems are long, thus minimizing the number of leaves attached to heads cut about 6 inches below the top of the heads.

First trial

The first trial was precision-planted September 10 at 2-inch spacing with a Stanhay planter in rows 14 inches apart on the bed and 26 inches across the furrow. Plots were in Swift and Brucker's broccoli field north of Hueneme Road south of Oxnard.

On October 1, four plots consisting of 120 ft of bed each were hand thinned by pulling plants, and another set of four plots of the same size were left unthinned. Thinned and unthinned plots were arranged in a randomized complete block design. On October 22, plants in all plots were counted and it was found that the average spacing in the thinned plots was 5.7 inches between plants and in the unthinned plots the spacing was 3.4 inches between plants.

Sample harvested

On December 2, 4, 6, 8, 10, and 12, a sample of 20 ft of bed was harvested from each plot. The locations of these 20-ft samples were randomized within each main plot. When these samples were harvested, all heads were taken regardless of size or maturity, to simulate mechanical harvesting. All heads were cut to a 5-inch length. Each sample was graded into three classes (spears, chop, and culls) by Kenneth Knapp, Quality Control Manager of Oxnard Frozen Foods. Heads in each sample were counted and heads and parts of heads in each quality class were weighed.

Plants spaced at 5.7 inches produced over 600 lbs per acre more spears than those spaced at 3.4 inches (see graph 1). This was true for six picks and for yields at peak yield of spears. Plants spaced at 5.7 inches produce about 450 lbs per acre less chop-grade broccoli than those spaced at 3.4 inches, and up to 560 lbs per acre less at the peak yield of spears.

A number of conclusions were drawn regarding the differences in broccoli head