Economic Survey of Resources Used by Dairy Farmers in Oklahoma

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CONTENTS

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At any one time, individual producers show substantial variation in the cost-return relationship of their business operations. In other words some farms are doing better than others. By a study of a considerable number of farms, some of the reasons for these differences in income may be brought to light in such a way that farmers who are looking for an opportunity to improve their businesses may find them among the practices of their neighbors. It was for this purpose that a study of dairy farming in the Central Oklahoma City milkshed was initiated.

It should be kept in mind that these data are representative of what actually happened on 190 farms proportionally selected from all parts of the Oklahoma City fluid milk producing area. They include the existing proportions of both the poorly managed and the better managed herds and all existing gradations of profitableness. They are not here set forth as recommendations to be followed by any dairyman. If an individual should find that his figures agree closely with these averages he should conclude merely that his operation is no better and probably not much poorer than the average of all dairymen. In that case he should not expect to make more than merely the average amount of profit.

How the Information Was Obtained

In the summer of 1950 a sample of approximately 16 percent was drawn from the list of milk producers on the Oklahoma City market. The farms were drawn by number rather than by name and without regard to size of herd, rates of milk production per cow, or any other known factor, except that all localities were sampled in like proportions. This procedure was used so that all gradations in size of business and practices of management and operation had a chance of being in the sample in the same proportion as they existed among all producers. The location of the sample of producers is shown in Figure 1.

These producers were visited and interviewed on the farm by trained enumerators who obtained data on the previous year's business. The business year used for this business was the calendar year 1949.**

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** It should be noted that rainfall in 1949 was approximately normal in the area studied and was well distributed throughout the year.

Inventories, purchases, sales, cash receipts, and expenses were obtained. Milk sales were recorded from the stubs of milk checks or from records made available by the milk receiving plants with the farmer's permission. Estimates were obtained from each farmer as to the percentage of full forage provided by the various pastures used. Each farmer was also asked to evaluate his farm in relation to what he would demand from the farm business in terms of income in order to continue the farm operation rather than accept an alternative.

Completed records for which costs and returns in dairying could be computed were obtained for 190 farms. An effort was made in all cases to differentiate between the summer or grazing season and the winter or hand feeding period. Determination of the summer season was made in conference with the farmers on the basis of the effectiveness of the grazing season, beginning when grazing became sufficiently abundant for him to reduce substantially his hand-feeding program and ending when the grazing had diminished sufficiently to induce him to re-establish a substantial hand-feeding program. Summer and winter costs and returns could be summarized separately on 140 of the 190 farms.

In determining costs of production, the values of all purchased inputs which applied directly to the process of production were taken at their purchase prices plus additional expenses for bringing such input materials to the farm. For home-grown feeds the market price was adjusted to the farm level and was used on the basis that the farmer had the alternative of selling such products at such prices on the market rather than offering them to the dairy herd. A like procedure was used in estimation of pasture costs and values of unpaid labor. The assumption was that the costs which were pertinent were those which must be covered by the returns in order to assure a continued use of such items in the business of milk production.

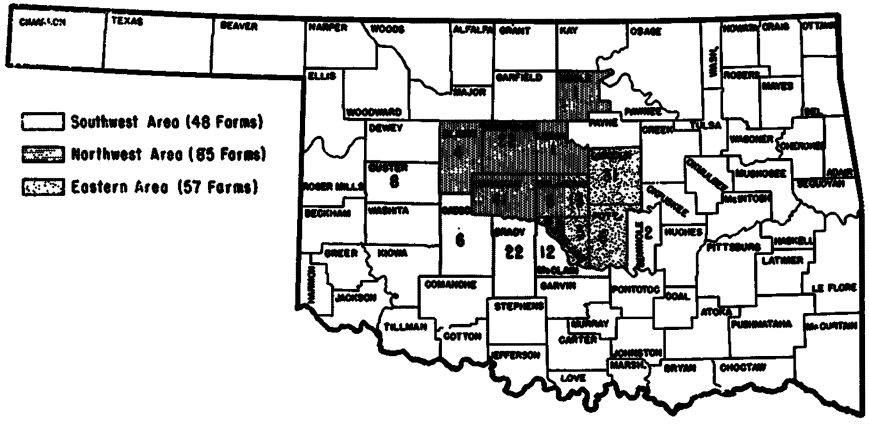

Fig. 1—Location and Number of Farms Included in the Survey.

In this study three major cost categories received special emphasis. These were pasture, hand-fed feeds, and direct man labor on cows. In studies made in other parts of the United States, these three items have accounted for three-fourths to four-fifths of the total cost of producing grade A or fluid milk. In most of these studies, however, average figures for the entire year have been used as the basis for analysis of cost-returns relationships rather than dividing the data between summer or winter as was done in this study.

Milk Sales and Prices

The payoff in milk production comes not at the milk pail but in the milk check. Milk sales by farmers included in this study averaged 86,780 lbs. per farm at a gross value of $4,270. This was an average of 5470 lbs. per cow per year or 15 lbs. per cow per day. In addition, the farmers used on the farm for various purposes a total of 8,807 lbs. of milk per year, or about 24 lbs. per day. This additional production averaged 555 lbs. per cow, bringing the total milk production per cow to 6,025 lbs. for the year or 16.5 lbs. of milk per day.

Of all milk sold, 98.7 percent was grade A. The remainder consisted of the milk equivalent of cream that was sold as butterfat, small quantities of retail sales, and sale of grade C milk (Table 1). All of the grade A milk-receiving plants were operating under base-surplus plans which applied during certain months of the summer season but varied somewhat among the plants. A few farmers just coming into the market were paid at grade A prices on a classification known as interim A or temporary grade A until they were on the market long enough to establish a base, that is, receive an allotment of the total market base of that plant.

The average price received for all milk sold was $4.92 per 100 lbs. Base milk averaged $5.09, overbase was $4.11, and interim milk $4.59 per 100 lbs. The average price of all grade A milk was $4.94

Table 1.—Distribution and Average Plant Price for All Milk Sold

	Percent of Total	Average Price for 100 Pounds
Grade A:		
Base milk	83.1	$5.09
Overbase	13.4	4.11
Interim	2.2	4.59
Total	98.7	4.94
Grade C	1.1	3.11
Retail	.1	5.83
Cream	.1	2.46
All milk	100.0	4.92

per 100 lbs. compared with $3.11 for grade C milk and $2.46 for cream sold as butterfat.

Milk used on the farm included consumption in the farm household and the amounts fed to calves or other livestock. The value placed on such milk was determined by subtracting from the plant price the cost of hauling and transportation tax, the cost of the market permit and any other costs, fees or contributions incident to the marketing but not the production of the milk. Milk sucked by calves was valued at a lower price than that milked, to allow for the costs of milking. The average value of milk used on the farm was $4.17 per cwt.

The base surplus pricing plan is a scheme devised to encourage milk production during the winter months when the supplies are seasonally small, and correspondingly to discourage production during the early summer months when supplies are seasonally large. It results in a higher average price for milk delivered during the winter months or shortage period than for that delivered during the surplus season, primarily because a larger proportion of milk is delivered at Class I prices. Class I in general includes the A-grade milk that is used in fresh fluid form. Surpluses exceeding this amount are generally used in some form of manufactured dairy product. Average discounts for surplus milk above the base allotment are indicated by the price of $4.11 received for such milk at the plant in contrast to $5.09 for base milk.

The decision facing most of the dairymen who were interviewed was whether the higher average price received for milk produced during the slack production period would offset the added cost of production required to even out the milk flow during the year. Some farmers definitely stated that the availability of pastures during the summer season reduced production costs sufficiently that they were able to make more profit on the summer production even at lower prices than on the winter production. On the other hand, some were attempting to provide supplemental pastures and supplemental hand-fed feeds to lengthen the grazing season, and were attempting to induce a relatively high percentage of freshening in the early fall and winter months.

Pastures Used for Oklahoma Dairy Cows

Oklahoma's grazing lands are generally considered one of the state's major agricultural assets. This is no less true of dairy than of beef production. The Oklahoma City milkshed is situated in a zone that averages 200 to 220 days in each year without a killing frost. This is normally called the growing season. When this factor alone is considered, one may conclude that Oklahoma naturally has a long grazing season, and may over-estimate the value of pastures as one of the most important basic resources for milk production. It is evident that open weather alone does not insure either a steady or an abundant milk flow.

For the purpose of evaluating pastures in dairy production, procedures were devised for measuring the contribution of various kinds

of grazing materials to the dairy enterprise. Each farmer who cooperated in the study was asked to evaluate each pasture used on his farm the preceding year. For each pasture, he gave an estimate of the effective grazing period from the beginning of the season, "when the hand-feeding program could be reduced because of the productivity of pastures," to the end of the effective grazing season, when it again became necessary to supplement the pastures with hand-fed materials. The dates of grazing and the number and kinds of each class of livestock by age groups were recorded for each pasture for each month during the effective grazing period. The producer then estimated the percentage of full forage grazing equivalent that was provided by each respective pasture for each month. Percentage full forage was explained to farmers as the percent of the amount and kind of grazing the animal would have eaten had the forage been available.

The animals grazed on each pasture were converted to animal-unit equivalents in terms of a mature cow. In this way all classes and ages of livestock could be combined and the number of animal-unit days of grazing could be determined for each month on each kind of pasture. These animal-unit days then were multiplied by the percentage of full forage to determine the animal-unit days full-forage equivalent of grazing produced on each pasture each month. On the basis of these computations, vast differences were observed in the production of the different kinds of grazing materials on the different farms and in different parts of the Oklahoma City milkshed (Table II).

The area of the Oklahoma City milkshed falls naturally into what might be called three pasture provinces. These are the Northwest area which merges into the commercial wheat belt, the Eastern area commonly called the Cross Timber or Blackjack area, and the Southwestern part of the milkshed in which some of the prairie type region and the Blackjack region are intermingled.

On the 190 farms included in the study, 60 kinds of grazing material were reported. These included 4 kinds of permanent pasture, 7 kinds of winter grain crops later harvested for grain, 5 kinds of cereal grasses not harvested for grain, 7 kinds of mixtures of cereal grasses and legumes, 5 kinds of other types of grasses mixed with legumes, 8 kinds of straight legumes, 4 kinds of other grasses, 7 kinds of crops intended for the harvest of hay or seed, 4 kinds of cultivated crop fields grazed after the cultivated crop had been harvested, and 9 kinds of stubble fields, aftermath and the like. As would be expected, permanent pastures, chiefly native, provided the bulk of the animal-unit grazing days.

In the Southeastern part of the Oklahoma City milkshed, 58 percent of the total grazing in terms of animal-unit days consisted of permanent pastures, while winter grain crops, cereal grasses, and other grasses each accounted for 10 to 11 percent. In the Northwestern area extending toward the wheat belt only 54 percent of the total animal-unit days of grazing came from permanent pastures, whereas 23 percent was provided by winter grain crops. In the Eastern part of the area 61 percent

Table II. — Kinds of Grazing and Cost Per Cow-Month in Oklahoma City Milkshed

Kind of Pasture	Southwestern Area					Northwestern Area					Eastern Area				
	No. of Farms	Percent of Total Acres	Animal Unit-Days per Acre Annually	Percent full forage	Cost per Cow-Month*	No. of Farms	Percent of Total Acres	Animal Unit-Days per Acre Annually	Percent full forage	Cost per Cow-Month*	No. of Farms	Percent of Total Acres	Animal Unit-Days per Acre Annually	Percent full forage	Cost per Cow-Month*
Permanent															
Native	45	52.6	32.7	65.0	$1.55	83	40.5	29.3	54.6	$1.97	57	80.3	20.2	56.8	$1.46
Lovegrass	4	1.7	30.1	82.1	2.12	--	---	---	---	-----	--	---	---	---	----
Other	2	.3	114.8	81.0	2.29	--	---	---	---	-----	3	0.7	69.9	91.6	1.93
Cereals for Grain															
Wheat	21	23.7	10.2	69.8	$3.20	55	45.5	9.3	71.9	$2.80	7	3.1	25.7	36.4	$1.30
Oats	3	1.2	55.2	57.9	1.87	21	3.6	18.4	73.0	2.39	8	3.6	36.5	46.9	1.54
Other	3	0.8	32.1	95.7	3.00	2	0.2	119.6	60.7	4.66	3	0.6	63.6	55.6	2.10
Cereal Grass															
Oats	7	3.5	62.7	66.4	$1.50	--	---	---	---	-----	--	---	---	---	----
Other	9	1.5	67.1	77.1	2.13	11	1.1	60.2	76.6	2.86	11	1.8	85.7	44.3	$1.56
Cereal grass & legumes															
Vetch and Oats	--	----	----	---	----	--	---	---	---	----	4	1.4	122.9	52.4	$1.82
Other	7	1.6	49.8	63.1	$1.98	13	1.2	46.1	82.3	$4.22	10	1.5	72.0	62.3	1.22
Other grass & legumes	2	1.1	34.1	69.1	2.00	3	0.4	60.0	57.8	3.36	--	---	---	---	----
Legumes	6	1.5	44.6	81.6	$2.23	15	1.4	37.2	67.7	$3.75	14	1.7	78.6	69.6	$1.82
Grasses															
Sudan	24	4.1	70.9	76.0	$2.60	40	3.0	74.5	75.5	$2.96	7	1.3	75.7	85.2	$1.70
Other	2	0.5	129.1	85.9	2.24	2	0.2	48.8	63.2	1.76	6	0.8	68.4	69.1	1.83
Hay or Seed Crops Pastured	2	0.7	30.6	65.9	$2.00	5	0.2	35.7	79.4	$2.50	4	0.7	22.3	60.6	$3.24
Crop Aftermaths	10	5.2	15.1	70.6	$1.84	23	2.7	24.5	50.5	$2.12	14	2.5	35.3	46.3	$1.71
All Farms	48	100.0	30.9	68.4	$1.88	85	100.0	22.0	62.4	$2.41	57	100.0	27.4	57.2	$1.54

* Costs estimated at time of survey in summer of 1950 and based on grazing rental values for similar pastures.

of the total animal-unit days of grazing was provided by permanent pastures and only 9 percent by winter grain crops.

Contrary to popular belief, or at least expression by many persons, the length of effective grazing season was not 200 to 220 days, as would be indicated by the length of the frost-free period, but averaged only 168 days for all farms included in the study. In the Northwestern area the average length of effective grazing season was 158 days, in the Eastern area 174 days, and in the Southwestern area 182 days. Apparently this was affected both by the species of grazing materials grown and by the type of climate.

The shortest effective grazing season on any one farm was less than 90 days and the longest was 299 days. About 24 percent of the farms had effective grazing periods of less than 150 days. On the other hand, only 19 percent of the producers had effective grazing seasons of 190 days or more (Figure 11). These periods included only the length of time in which the farmer did not substantially adjust his hand-feeding program. Several producers commented that they should have been feeding their cows hay or silage earlier in the fall, and in some instances later in the spring. In other words, for much of the time, both the cows and the producers were depending on pasture productivity that was not there. For example, some of the producers in the Eastern and Northwestern areas were depending upon native permanent pasture in the months of January and February when the percentage of full forage production dropped as low as 15 to 20 percent, whereas similar pastures in the month of June had provided 70 to 80 percent of full forage.

The amount of grazing provided by native permanent pasture per acre, per year, averaged 26.1 animal unit days for the entire area and varied from 20 animal-unit days in the Eastern area to 29 in the Northwestern and about 33 in the Southwestern area (Table II). The distribution of this grazing by months throughout the year is shown in Table III. The average percentages of full forage provided by permanent pasture varied from about 55 to 65 among the areas and was 57.9 for the entire milkshed. Many of the other kinds of grazing materials, particularly the winter cereals, were much more productive of animal-unit days per acre and higher percentages of full forage. However, they accounted for a much smaller proportion of the total grazing than that provided by native permanent pastures. Of all the grazing, about 29 percent of the animal-unit days represented winter grazing for the milkshed as a whole. This varied from about 24 percent in the Southwestern area to as high as 32 percent in the Northwestern area.

One might well raise the question of whether the costs of supplemental grazing provided mainly in the off-pasture season would be justified by additional incomes produced, especially since the estimated rental values per cow-month and the computed costs per animal-unit day full-forage equivalent were considerably higher than those for native permanent pasture. By irrigation, excessive fertilization, and other costly procedures, conceivably it would be possible for a producer to

provide effective grazing throughout most of the year, in view of the relatively high proportion of open weather prevailing most of the time in Central Oklahoma. The rates of milk flow per cow per day and the relative prices available for milk produced outside the natural pasture season as well as shifts in input costs, would be important factors relevant to whether or not this would pay.

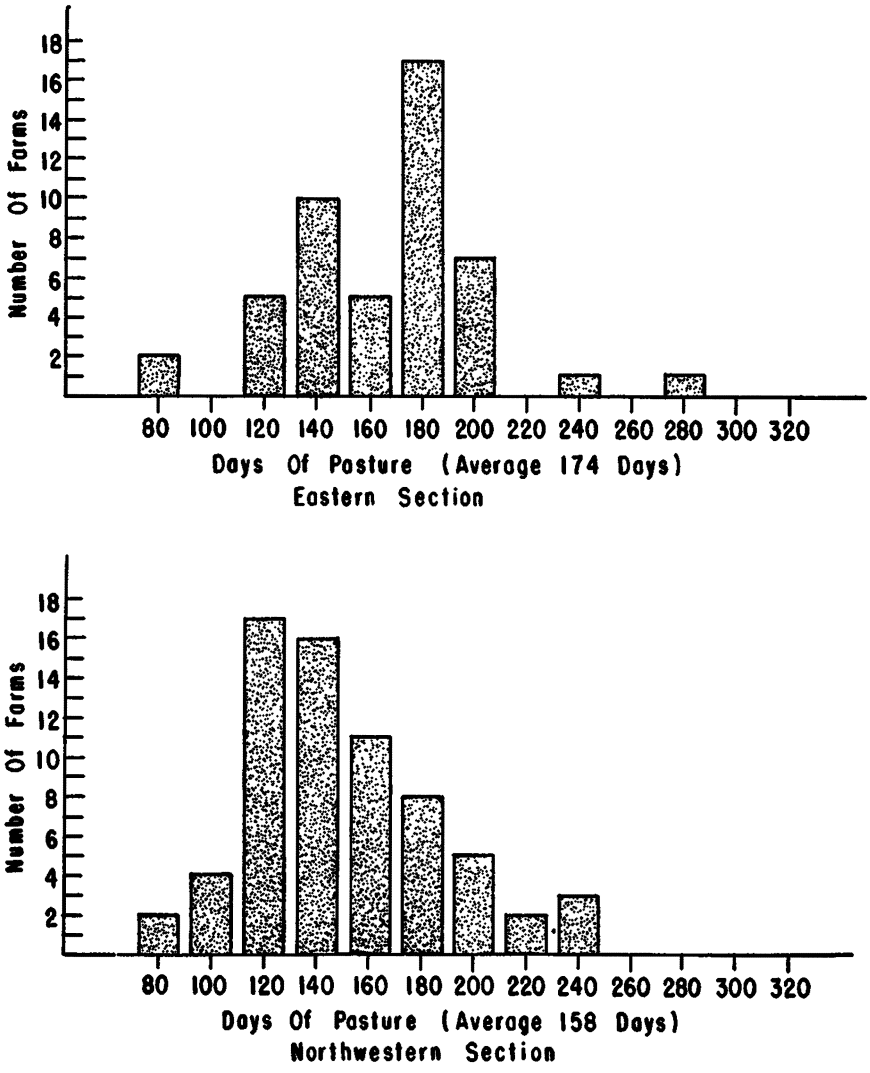

Fig. 2—Average Length of Pasture Season for the Eastern and Northwestern Sections of the Oklahoma City Milkshed.

Table III.—Animal-Unit Days of Full Forage per Acre by Months for Different Kinds of Pasture.

Kind of Pasture	Total Acres	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total A.U.D. Per A.
Northwestern Section														
Wheat (for grain)	10785	.70	.64	.13	0.2	---	---	---	---	---	.60	2.09	2.52	6.70
Native permanent	9613	.06	.06	.42	1.31	3.54	3.72	3.02	2.07	1.32	.35	.07	.04	15.98
Oats (for grain)	848	.90	.82	.09	.22	.06	---	---	---	---	3.12	4.24	4.01	13.46
Sudan grass	716	---	---	---	.38	3.58	12.96	17.09	14.99	6.17	1.03	.04	---	56.24
Peas, cowpeas/pasture	198	---	---	---	---	---	---	1.42	3.57	8.54	6.28	.36	---	20.17
Vetch, & other grain	176	2.58	2.38	3.22	5.48	5.52	.12	---	---	---	.48	9.34	8.92	38.04
Wheat (for pasture)	165	7.83	7.11	7.91	4.73	---	---	---	---	---	.80	13.30	13.75	55.43
Other pasture sowed	80	2.40	2.16	2.40	6.18	3.86	2.70	---	---	---	---	2.06	2.56	24.32
Vetch & wheat/pasture	77	2.24	2.11	12.48	3.23	1.25	1.17	---	---	---	---	5.63	3.92	32.03
Oats (for pasture)	67	.60	1.28	3.12	9.03	.16	---	---	---	---	---	.39	.52	15.10
Southwestern Section														
Native permanent	4942			.16	1.54	4.24	4.56	3.81	3.03	2.26	1.20	.31	.14	21.25
Wheat (for grain)	2231	.41	.57	.99	---	---	---	---	---	---	.36	2.18	2.61	7.12
Sudan grass	386	---	---	---	---	.30	8.56	16.59	15.92	9.84	2.64	---	---	53.85
Oats (for pasture)	326	1.06	1.17	6.07	8.34	2.77	2.07	2.51	2.23	2.95	3.17	2.13	7.16	41.63
Lovegrass permanent	163	---	---	1.37	3.49	2.50	3.59	3.94	4.63	4.09	1.13	---	---	24.74
Oats (for grain)	113	---	---	---	---	---	---	---	---	---	13.77	14.68	3.53	31.98
Wheat (for pasture)	83	.26	3.79	11.77	16.69	11.18	---	---	---	---	---	1.74	2.80	48.23
Oats, vetch & rye grass (for pasture)	80	1.82	.06	---	---	---	---	---	---	---	---	7.44	7.69	17.01
Vetch & rye (for pasture)	76	.12	.25	2.49	3.73	3.73	2.49	---	---	---	1.76	3.29	14.50	32.36
Sweetclover	65	---	---	---	---	3.10	5.62	9.40	15.59	6.40	1.41	---	---	41.52
Eastern Section														
Native permanent	10696	.05	.03	.15	.63	2.29	2.66	2.15	1.56	1.18	.55	.15	.08	11.48
Oats (for grain)	487	3.03	3.00	2.00	---	---	---	---	---	---	1.20	3.90	4.03	17.16
Wheat (for grain)	410	2.38	1.86	.24	---	---	---	---	---	---	.96	1.52	2.39	9.35
Vetch & oats/pasture	183	.35	2.75	9.69	16.02	10.84	5.63	2.19	2.19	2.22	3.60	2.88	6.04	64.40
Sudan grass	170	---	---	---	---	2.28	14.84	14.08	14.36	13.46	5.46	---	---	64.48
Lespedeza	115	---	---	---	.96	1.49	8.16	26.64	23.25	6.45	.99	---	---	67.94
Oats (for pasture)	97	16.47	15.69	16.56	7.96	.66	---	---	---	1.94	1.00	.73	.50	61.51
Vetch & rye (pasture)	79	4.99	6.31	11.59	10.34	4.60	---	---	---	7.50	---	---	---	45.33
Rye (for pasture)	75	---	---	---	---	---	---	---	---	---	3.14	4.43	5.24	12.81

Non-Pasture Feeds Used For Oklahoma Dairy Cows

The provision of feeds in sufficient abundance for Oklahoma milk production is one of the greatest problems encountered by dairymen. The efforts of Central Oklahoma dairymen to have their cows graze "everything in sight," discussed in the section of this report dealing with pastures, is evidence on this point. Among the 190 dairy farms included in this study, 53 separate designations of materials fed to cows by hand were reported. These included 7 kinds of grains and seeds either brought or home-grown, 13 kinds of carbonaceous mixed feeds, 8 kinds of protein supplements or mixed feed ingredients, 3 kinds of mineral or vitamin feeds, 5 kinds of silages, 6 kinds of legume hays, 8 kinds of hays made from grasses of various species, and 3 kinds of coarse forages representing crop residues.

It was more common than not for a dairyman to feed his cows some type of concentrate feed during the effective summer grazing season. The average total amount of concentrate feed fed per cow per month during the summer was 188 lbs. which had an average value of $5.82. This compares with 267 lbs. of concentrates during the winter period valued at $7.92. (Table IV).

A few dairymen having silage began feeding some of this material before the end of their effective grazing seasons. In some cases also some of the dairymen fed their cows hay or other forms of dry roughages before the end of the effective grazing season. The average amounts of these materials used per cow month on the 140 farms for which feeds were separable between summer and winter seasons were 58 lbs. of silage and 102 lbs. of dry roughages per cow month as compared with 268 lbs. of silage and 584 lbs. of dry roughages per cow month during the winter or hand-feeding period.

Table IV.—Summary of Feeds Given per Cow Month During the Summer, Winter, and Total for the Year for Oklahoma City Milkshed (140 farms).

	Summer per Cow-Mo		Winter per cow-Mo		Cow Year	
	Pounds	Value*	Pounds	Value*	Pounds	Value*
Concentrates Homegrown	51	$1.33	113	$2.91	1017	$26.16
Purchased	137	4.49	154	5.01	1775	58.04
Total	188	$5.82	267	$7.92	2792	$84.20
Silages	58	$ .22	268	$ .96	2053	$ 7.42
Dry Roughages	102	.89	584	4.90	4366	36.68
Total	160	$1.11	852	$5.86	6419	$44.10
Total Feed		$6.93		$13.78		$128.30

* Based on values in 1950.

The total cost of hand-fed materials per cow month in the summer season averaged $6.93 as compared to about twice as much, or $13.78 per cow month, during the winter season.

Silages constituted a relatively uncommon type of feed. On the 140 farms for which feeds could be separated between the summer

Table V.—Feeds Given to Cows Per Cow Day, and Cow Year, by Areas and Seasons

Feed Group	Southwestern (24 Farms)		Northwestern (68 Farms)		Eastern (48 Farms)		All Areas (140 Farms)	
	Cow Day		Cow Day		Cow Day		Total	
	Pounds	Value[1]	Pounds	Value[1]	Pounds	Value[1]	Pounds	Value[1]
Summer Grazing Period								
Concentrates:[2]								
Carb. Home-grown	2.2	$0.05	1.6	$0.04	1.5	$0.04	284	$ 7.35
Purchased	3.8	.13	4.3	.15	4.7	.15	739	24.27
Mineral Feeds	.1	.01	.1	.00	.2	.00	22	.76
Total	6.1	$0.19	6.0	$0.19	6.4	$0.19	1045	$32.38
Silages	1.8	$0.01	1.8	$0.01	2.1	$0.01	322	$ 1.19
Dry roughages:								
Legume hays	3.4	$0.03	1.8	$0.02	2.1	$0.02	377	$ 3.51
Grass hays	.5	.00	.6	.01	.8	.00	112	.75
Coarse roughage[3]	.2	.00	.1	.00	.3	.00	26	.14
By-products[4]	.4	.00	.2	.00	.2	.00	36	.24
Grain roughages[5]	.5	.01	.0	.00	--	----	21	.31
Total	5.0	$0.04	2.7	$0.03	3.4	$0.02	572	$ 4.95
Grand Total		$0.24		$0.23		$0.22		$38.52
Winter Hand-Feeding Period								
Concentrates:								
Carb. Home-grown	4.4	$0.10	3.6	$0.10	3.6	$0.09	733	$18.81
Purchased	4.0	.14	4.9	.16	5.7	.17	988	32.06
Mineral feeds	.2	.01	.1	.00	.1	.01	26	.95
Total	8.6	$0.25	8.6	$0.26	9.4	$0.27	1747	$51.82
Silages	15.5	$0.05	7.0	$0.03	7.9	$0.03	1731	$ 6.23
Dry Roughages:								
Legume hays	12.1	$0.12	11.9	$0.12	11.3	$0.10	2309	21.83
Grass hays	2.9	.02	1.9	.02	8.8	.06	841	5.73
Coarse roughage	3.0	.02	4.1	.02	.6	.00	548	3.23
By-products	.2	.00	.2	.00	.1	.00	31	.28
Grain roughage	1.7	.02	.1	.00	---	----	65	.66
Total	19.9	$0.18	18.2	$0.16	20.8	$0.16	3794	$31.73
Grand Total		$0.48		$0.45		$0.46		$89.78
						Yearly Total		$128.30

[1] Based on prices at the time of the survey in 1950.
[2] Grains, prepared mixtures, supplements.
[3] Corn or sorghum fodders, bundle feed.
[4] Hulls of cottonseed or peanuts, and ground alfalfa.
[5] Soybean bundles, head feed, sheaf oats.

and winter seasons only 38 instances of the use of any kind of silage were found. When these were averaged by all cows in the herds of all the farms, the quantities of costs per cow day were found to be relatively small. On 9 of the 24 farms in the Southwestern area, silages fed to cows were sufficient to average 15.5 lbs. per cow day in the winter season per farm among the 24 farms (Table V). The average of 12.2 lbs. per cow day in the other Eastern counties outside Lincoln represents the silage provided cows on 5 of the 23 farms.

Of all dry roughages used in milk production, legume hays were the most popular, averaging from 11.3 to 12.1 lbs. per cow day, among the areas. Alfalfa was by far the most popular type of legume hay. When hay was bought for feeding to cows, it was generally alfalfa. In Canadian County, for example, only 38 percent of the alfalfa hay given to cows was home-grown. In the other Northwestern parts of the milkshed, 49 percent of the alfalfa was home grown and in the Southwestern area 61 percent. In Lincoln County, 81 percent of the alfalfa fed to cows was home-grown, as compared with 56 percent in other Eastern parts of the milkshed. Other kinds of legume hays were produced on the farm where they were fed, as was true of most of the hays made from various species of grass with the exception of prairie hay.

Contrary to what might have been expected, prairie hay was not the dominant type of grass hay used in milk production. In Lincoln County and in other Eastern parts of the milkshed, Johnson grass hay was the predominant kind. In other parts of the milkshed a variety—including oats hay, sudan grass hay, sorghum hay, millet hays, and Johnson grass—was more important in total than the prairie hays.

The average total amount of dry roughages consumed per cow day during the winter varied from 17.6 pounds in Canadian County to 22.8 pounds in Lincoln County, and the cost figures ranged from 14 cents per cow day in Canadian to 18 cents a day in other Northwestern counties and in the Southwestern part of the area.

The use of supplemental feeds during the effective grazing season, and the wide variety and kinds of feeds used, are perhaps indicative of some recognition of the difficulties involved in providing sufficient continuous feed supplies for economical milk producton. The wide variety and form of roughage may also reflect the variety in kind of crops grown on land not well adapted to the production of high-valued market crops.

Labor Used on Dairy Cows

Many farmers are inclined to underestimate the value of their labor. It is often valuable to subtract from the value of the product other costs which have been incurred in its production to determine how much is left to pay for the labor devoted to the enterprise. Yet, it is commonly recognized that the business of dairy farming is somewhat confining and requires somebody's presence and attention daily. Presumably one becomes so accustomed to such continuous activity that

he accepts it as a form of life and does not take time to evaluate the amount of the contribution that is being made in a business way.

On the dairy farms included in this study, the average amount of man labor devoted directly to the cows amounted to 18.5 to 22 minutes per cow day during the summer season in different parts of the Oklahoma City milkshed (Table VI). Usually two or three minutes more per cow per day was required in winter than in summer. These averages include only the direct labor on the cows of a daily and intermittent nature. Indirect labor such as hauling milk, grinding and mixing feed, repairing of utensils and the like was not included. From 50 to 70 percent of the total direct labor was used in the milking operation itself. Operations next in importance were washing utensils, cleaning the barn, and feeding concentrate feeds. Roughage feeding, even in the winter, was accomplished in less time than was the grain feeding because it was not individualized.

The milking operation itself required slightly more time per cow day during the winter than was required during the grazing season. Washing of utensils took about the same amount of time in summer or winter. Cleaning of the barn required only a slight increase in

Table VI.—Summary of Direct Man Labor on Cows per Cow Day and Cow Year by Operations and Season.

Operation	Southwestern (24 Farms)		Northwestern (68 Farms)		Eastern (48 Farms)		Total (140 Farms)	
	Minutes	Value*	Minutes	Value*	Minutes	Value*	Hours	Value*
Summer								
Milking	9.4	$0.122	13.3	$ .210	14.3	$ .243	34.0	$32.76
Washing utensils	3.3	.041	2.7	.042	2.9	.048	7.4	6.92
Cleaning barn	3.2	.041	2.0	.031	2.3	.039	5.9	5.54
Grain feeding	1.5	.016	1.0	.017	.5	.009	2.3	2.12
Roughage feeding	.1	.001	---	-----	.3	.005	.3	.30
Driving	.7	.010	.8	.012	1.2	.021	2.5	2.44
Miscellaneous	.1	.001	.1	.002	.2	.003	.4	.38
Undesignated	.2	.004	.5	.007	.3	.005	1.1	.93
Total	18.5	$0.236	20.4	$0.321	22.0	$0.373	53.9	$51.39
Winter								
Milking	9.6	$0.120	13.5	$0.206	14.3	$ .245	40.6	$38.39
Washing utensils	3.5	.046	2.8	.040	3.0	.050	8.9	8.05
Cleaning barn	3.5	.046	2.2	.032	2.5	.043	7.4	6.80
Grain feeding	2.3	.026	3.0	.047	1.3	.022	7.0	6.64
Roughage feeding	1.1	.015	.5	.007	1.8	.031	3.4	3.16
Driving	.2	.004	.5	.007	.3	.006	1.3	1.21
Miscellaneous	.2	.003	.1	.001	.3	.005	.5	.49
Undesignated	.1	.002	.6	.008	.1	.001	1.1	.89
Total	20.5	$0.262	23.2	$0.348	23.6	$0.403	70.2	$65.63

* Estimated value of labor per hour varied from about 78 cents in the Southwestern area to 92 cents in the Northwestern and $1.02 in the Eastern. For all areas, the average value per hour was 95 cents in the summer and 93 cents in winter.

time per day in winter compared with the time required in summer. Time required for grain feeding was approximately doubled between summer and winter. This was partly offset by a slight saving in the time required for driving, tying and releasing of the cows. Miscellaneous operations included attention given to the cows at breeding time, at calving time, assistance to the veterinarian, and other intermittent tasks.

The costs of this labor time were determined on the basis of the farmer's estimate of how much he must earn in order to be persuaded to continue in dairy farming rather than to accept his next best alternative. Hired labor was charged at the prices actually paid, including allowances for board, rent, or other privileges furnished to him in addition to wages. Work done by younger members of the family, older persons of declining activity, and by women was estimated in terms of man equivalent by the producer. The total valuation of all labor used on the farm was then apportioned to the dairy enterprise on the basis of what proportion of the total farm business was represented by dairying. If the farmer had included indirect labor of producing, grinding and mixing feeds or other such work, these activities were omitted in determining the charge to be made to the dairy. For these purposes the total dairy enterprise included the raising of young stock and the keeping of herd bulls, along with the milk cows. Labor used for the herd bull and young stock was charged directly to them and not to the cows.

Surprising as it may seem to some persons, labor cost thus determined often exceeded the value of feed and pasture combined during the grazing season and amounted to from one-half to two-thirds the value of feeds used in the winter season. Labor costs per cow day averaged lowest in the Southwestern area, at about 24 cents during the summer and 26 cents during the winter. In the Northwestern part of the milkshed the costs were 31 to 33 cents in the summer and 34 to 35 cents per cow day in the winter. Labor costs in Lincoln county and other Cross Timber areas were somewhat higher per cow day in both winter and summer. These costs are of course affected both by the amount of time spent in direct care of cows and by the average labor cost per hour, which is greatly influenced by the proportion of all farm work, or total labor supply, for which the dairy enterprise had to pay. Many hours of inefficient labor would reduce the average cost per hour but not the annual cost. In the final analysis, it is the cost per unit of output that is compared with the selling price to measure the profit. Labor at a high price per hour may be the cheapest if each hour produces a relatively high output. A summary of feed and labor costs per cow is shown in Table VII.

In view of the fact that one-half to two-thirds of all labor directly expended on cows was represented by the milking operations alone, it was important to save labor in this operation. About 2 out of every 5 dairymen included in the study were using milking machines. The use of these machines was associated with a saving in time required for milking of about 5 minutes per cow day. Since the average time

Table VII.—Summary of Average Feed and Labor Costs and Returns Per Cow for Summer, Winter, and for the Year, 140 Herds.

Item	Summer		Winter		Year	
Concentrates:						
Homegrown	284 lbs.	$ 7.35	733 lbs.	$ 18.81	1017 lbs.	$ 26.16
Purchased	761 lbs.	25.03	1014 lbs.	33.01	1775 lbs.	58.04
Silages	322 lbs.	1.19	1731 lbs.	6.23	2053 lbs.	7.42
Dry roughage	572 lbs.	4.95	3794 lbs.	31.73	4366 lbs.	36.68
Pasture		16.98		8.27		25.25
Total Feed		$ 55.50		$ 98.05		$153.55
Labor	54 hrs.	$ 51.39	70 hrs.	$ 65.63	124 hrs.	$117.02
Total Feed and Labor		$106.89		$163.68		$270.57
Milk Sales and Home Use		$131.07		$153.35		$284.42
Returns over Feed and Labor		$ 24.18		$—10.33		$ 13.85

required to milk cows by hand was 16.5 minutes, this was a saving of almost one-third of the total milking time. A saving of this amount on 3 cows would provide enough time to milk another cow by hand. From the standpoint of the labor of milking it would appear that the use of milking machines alone would have enabled a farmer to increase the size of his herd from 40 to 50 percent. Milking machines were more commonly used by dairymen in the Eastern part of the area than in the other parts. In Lincoln County two-thirds of the producers were using milking machines, whereas in the Northwestern area except Canadian County, three-fourths of the producers were milking by hand. In the Southwestern area only about 1 farmer in 5 was using a milker.

Size of herd and manner of milking influenced the time required (Table VIII). Hand milking of herds of less than 10 cows averaged 19 minutes per cow day as compared with 17 minutes for herds of 10 to 19 cows and 13 minutes for herds of 20 to 29 cows. In the winter season the decline in average milking time associated with increased size of herd was slightly greater. Among the machine-milked herds there was no decrease in milking time per cow day as the size of herd increased. Washing of utensils did not absorb the milking time saved by the use of the machine, especially among the smaller herds. The total time required per cow for other than milking decreased with increased herd size for both machine- and hand-milking methods.

In general, increasing the size of herds from less than 10 cows to herds of from 20 to 29 cows was associated with about a one-third reduction in total direct labor per cow. With increased commercialization of dairying and the procedures involved in producing fluid milk for city market, it appeared that the scale of the operation—that is, the number of cows in the herd—would become an important factor in determining the profitability of milk production. The pay which a

Table VIII. — Direct Man-Labor per Cow-Day, Summer and Winter, Hand and Machine Milked, by Size of Herd

	Summer Grazing Period				Winter Hand Feeding Period			
	Less than 10 cows	10 to 19 cows	20 to 29 cows	30 or more cows	Less than 10 cows	10 to 19 cows	20 to 29 cows	30 or more cows
Herds Milked by Hand								
Number of Farms	14	31	5	1	16	29	5	1
Cows per farm	7.6	13.8	24.0	---	7.9	13.9	23.9	---
Days in season	157	173	156	---	204	194	209	---
Minutes per cow-day:								
Milking	19.1	17.0	13.2	---	19.1	17.2	12.9	---
Washing utensils	5.0	3.2	2.0	---	4.9	3.3	2.0	---
Cleaning barn	3.5	2.9	1.7	---	3.7	3.3	1.8	---
Grain feeding	.9	.7	.1	---	2.6	2.0	.5	---
Roughage feeding	0	.1	.2	---	1.1	1.0	.9	---
Driving	.2	1.4	.7	---	.1	.6	.5	---
Miscellaneous	.7	.1	.2	---	.4	.1	.8	---
Undesignated	.8	.5	1.6	---	1.1	.5	---	---
Total	30.2	25.9	19.7	---	33.0	28.0	19.4	---
Herds Milked by Machine								
Number of Farms	12	42	22	2	12.0	45	17	5
Cows per farm	7.9	14.3	23.6	31.9	8.1	14.8	23.4	33.2
Days in season	179	164	166	184	188	199	199	192
Minutes per cow-day:								
Milking	12.0	12.1	11.5	11.3	11.5	12.6	10.5	11.5
Washing utensils	3.8	3.4	2.2	1.9	3.9	3.2	2.2	2.0
Cleaning barn	3.3	2.5	1.7	1.2	3.2	2.3	1.8	2.1
Grain feeding	1.4	1.2	.7	.3	3.4	2.6	2.3	1.5
Roughage feeding	---	---	.2	.5	.6	1.0	1.3	.6
Driving	2.2	1.1	.5	.3	.9	.6	.2	---
Miscellaneous	.3	.2	.1	---	.2	.1	---	.2
Undesignated	.5	.6	---	---	.5	.5	---	---
Total	23.5	21.1	16.9	15.5	24.2	22.9	18.3	17.9

dairyman received for his labor after paying other expenses of production was influenced by the number of cows he kept. The opportunity that some dairymen have to reduce the amount of labor used in their dairy enterprise is pointed up by recognizing the large differences that exist in the amount of labor used per cow (Figure III).

Importance of Labor Efficiency to Returns

The number of pounds of milk producer per hour of labor is one measure of labor efficiency. There were 53 dairymen out of the 190 who had less than 35 pounds of milk production per hour of labor, Table IX. The average return above feed costs on these farms was only 47 cents per hour. On the other hand, there were 21 dairymen with more than 76 pounds of milk production per hour of labor. For these efficient farms, returns were $2.28 per hour, or almost five times as high as for the lowest group. The table also makes it clear that these high returns were the combined results of higher production per cow and the use of fewer hours per year to care for a cow. The use of milking machines was an important factor contributing to a reduction in the hours of labor required per cow. For the high-return

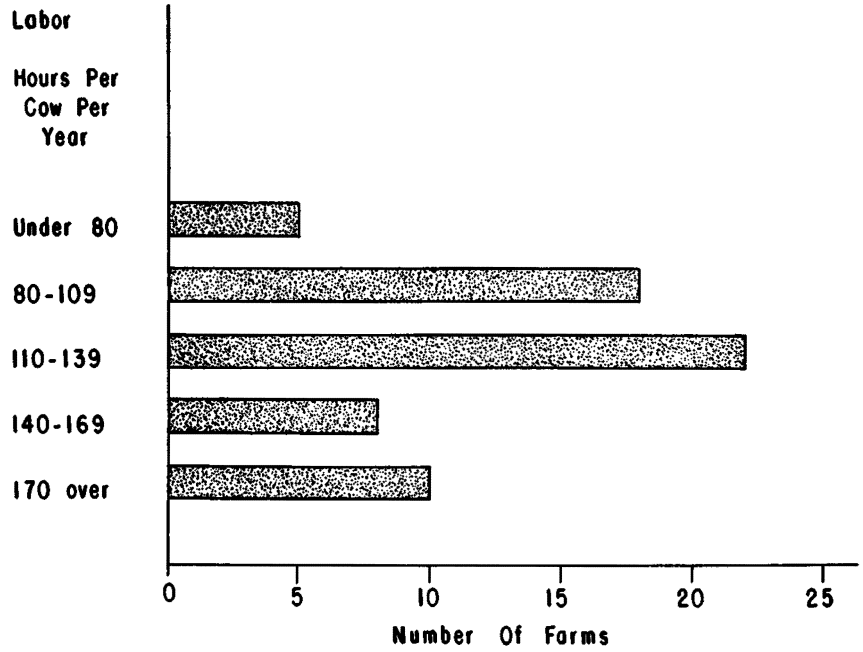

Fig. 3—Variations in Average Direct Labor Per Cow Per Year for Herds with 10-19 Cows Using Milking Machines.

Table IX.—Relation of Pounds of Milk Produced Per Hour of Labor to Returns Above Feed Costs

Pounds of Milk per hour of labor	No. of Farms	Percent with Machine Milkers	Pounds Per Cow Per Year	Hours of Labor Per Cow Per Year	Average Size of Herd	Returns* over Feed Cost** Per Cow	Returns Above Feed Cost Per Hour of Labor
Less than 35	53	36	4851	177	13.1	$ 83.00	$0.47
35-55	73	68	5768	129	15.6	$130.00	$1.01
56-75	43	79	6706	106	18.7	$152.00	$1.44
More than 76	21	90	7717	83	18.1	$189.00	$2.28

* Returns Include only Values of Milk Sales and Milk Used on Farm
** Feed Costs Include Cost of Pasture

group, annual production averaged 7,717 pounds per cow and only 83 hours of labor were used per cow. This compares with an average production of 4,851 pounds and 177 hours per cow for the lowest return group.

Relation of Size of Herd and Production to Annual Returns

The question often arises as to the number of cows required to make a living. The answer obviously depends in part on the productivity of the cows and the level of annual earnings desired by the operator. The relation of both size of herd and productivity to what the dairyman can expect for his year's labor, capital, and incidental expenses after paying feed costs is shown in Table X.

Dairymen with less than twelve cows and with production per cow below 5000 pounds had only $522.00 above feed costs for the year's operations. Herds with essentially the same number of cows but with production above 6500 pounds per cow had returns over feed costs of $1764.00. It is significant that this is higher than the $1579.00 received by the dairymen who kept an average of 24 low-producing cows.

Dairymen who are interested in returns above feed costs of around five thousand dollars per year need to think in terms of herds of around 25 well-bred and well-managed cows that will produce more than 6500 pounds of milk per cow. In the survey there were seventeen dairymen in this category, and their returns above feed costs for the year averaged $4524.00.

Table X.—Relation of Size of Herd and Production Per Cow to Average Yearly Returns Above Feed Costs Per Herd

	Size of Herd		
	Less than 12	12-16.9	17 or more
Less than 5000 lbs. Per Cow Per Year			
Number of farms	15	14	22
Average size of Herd	9	14	24
Pounds of milk per cow	4216	4330	3994
Returns*	$1828	$2951	$4654
Total feed cost**	$1306	$1840	$3075
Returns above feed cost	$ 522	$1111	$1579
5001-6500 Pounds Per Cow Per Year			
Number of farms	20	20	24
Average size of Herd	9	14	25
Pounds of milk per cow	5815	5824	5785
Returns*	$2573	$3970	$7237
Total feed cost**	$1410	$2250	$3837
Returns above feed cost	$1163	$1720	$3400
6501 and Above Pounds Per Cow Per Year			
Number of farms	30	28	17
Average size of Herd	9	14	24
Pounds of milk per cow	8140	7600	7760
Returns*	$3551	$5230	$8957
Total feed cost**	$1787	$2630	$4433
Returns above feed cost	$1764	$2600	$4524

*Includes milk sales and value of milk used on farm.
**Includes cost of pasture