DAIRY FARM MANAGEMENT PRACTICES TO REDUCE SEASONALITY OF MILK PRODUCTION IN THE DETROIT MILKSHED

Thesis for the Degree of M. S.

MICHIGAN STATE COLLEGE

Timothy L. Hodge

1950

This is to certify that the

thesis entitled

"Dairy Farm Management Practices
to Reduce Seasonality of Milk Production
in the Detroit Milkshed"

presented by

Timothy L. Hodge

has been accepted towards fulfillment
of the requirements for

M. S. degree in Farm Management

E. B. Hill
Major professor

Date March 9, 1950

DAIRY FARM MANAGEMENT PRACTICES TO REDUCE SEASONALITY OF MILK PRODUCTION IN THE DETROIT MILKSHED

By

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A THESIS

Submitted to the School of Graduate Studies
of Michigan State College of Agriculture and
Applied Science in partial fulfillment
of the requirements for the degree of

MASTER OF SCIENCE

Department of Agricultural Economics

1950

THESIS

ACKNOWLEDGEMENT

The author is indebted to Mr. Everett E. Peterson for his assistance in conducting this study, his aid and advice in analyzing the data, and for his counsel in the preparation of the manuscript.

Appreciation is especially expressed to Professors E. B. Hill, K. T. Wright, G.C.Quackenbush, C. R. Hoglund, W. H. Vincent, and other members of the Agricultural Economics Department whose co-operation made this study possible.

Appreciation is expressed to the Michigan Milk Producers Association and to many of the farmer members who cooperated in supplying information for this study.

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CHAPTER I

INTRODUCTION

Seasonal milk production is a challenging problem to the dairy industry. The problem arises from the characteristic differences between the effective fluid market demand and supply responses by producers through time (Fig. 1). Fluid milk demand is typically even from month to month during any one year except for secular trends and daily fluctuations. Price variations at the retail level have not been effective in adjusting the demand to seasonal supply responses.

The theoretical optimum in the market would be characterized by equilibrium between total supply and total demand in any season with enough excess over fluid milk demand to meet the requirements of daily fluctuation in demand and to provide the necessary milk for other than fluid uses. This assumes the monthly supply of milk would be even from season to season.

Supply responses deviating from this optimum create disequilibrium. Supply response is characterized by a seasonal high in the months of May and June and a low in November and December. Price plans have been devised to provide incentives for producers to shift supply responses toward a level production pattern. The theory of the price incentive plans is that higher production, in the months of normally short supplies, will be made more profitable

so that producers taking advantage of the plan will realize a higher net profit from their farm operation.

The problem of a dairy farmer who is operating under a price incentive plan is to obtain milk production timing responses from his herd in such a way as to maximize his net income. The problem is complicated by changes in costs of producing milk and by changes in total annual production per cow as production timing is shifted. Further, the incentive needed to bring about an increased net return from even milk production will vary from farm to farm, depending upon many factors.

The seasonal pattern of production does not conform to that of consumption, but varies from a high in the spring to a low in the late fall. This deviation from the optimum in the market causes problems in the necessity of having enlarged capacity to handle excess milk in the months of surpluses and the problem of shortages in the season of low production.

The excess of milk over fluid demand, except that necessary to cover miscellaneous uses, in the milk market during one season of the year requires enlarged transportation, processing and storage facilities over that which would be required had the same amount of milk been sold to the market, but at an even rate per month. This means that there will be an uneconomic use of much of the capital resources and labor, which necessarily will result in a lower price than that theoretically possible to the pro-

ducer, or higher prices to the consumer.

In some years, due to the highly seasonal variation in production, there are shortages in the low production period of the year. As a result, purchases must be made outside of the milkshed or the milkshed must be enlarged. Either method would result in a lower price of milk to the producer already in the milk market.

In periods of inadequate milk supply, consumers have suffered. Nutritional standards dictate an adequate supply of milk in consumers' diet. Shortages and rationing through dealers result in a loss of fluid sales and consequently a lower return to the producers.

Objectives of the study.- This study has two principal objectives. The first is to investigate the basic causes of seasonal milk production. The second is to determine what adjustments have been made by the even milk producers that characterize them in relation to other seasonal production patterns for the purpose of making recommendations in the application of these adjustments to other types of seasonal production patterns, assuming even production timing is desirable in terms of net income.

Area of the study.- This study is concerned with the seasonal milk problem in its effect on and the adjustments to it by the producers in the Detroit milkshed.

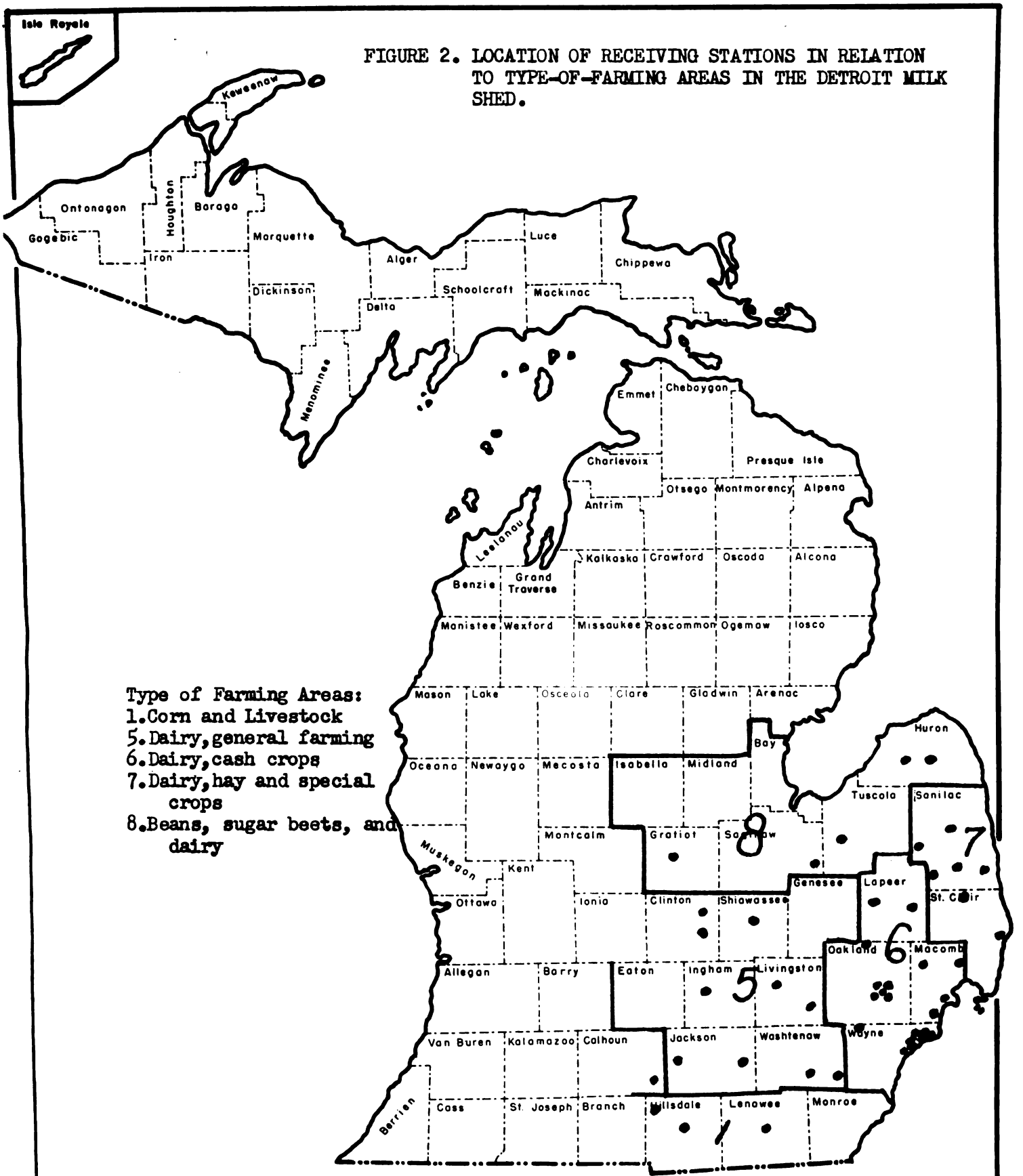
The Detroit milkshed comprises twenty-seven counties in the Southeastern part of the lower peninsula of Michigan (Fig. 2). The milkshed is represented mainly by five types of farming areas: Area 1, Corn and Livestock; Area 5, Dairy and General Farming; Area 6, Dairy and Cash Crops; Area 7, Dairy, Hay and Special Crops; and Area 8, Beans, Sugar Beets and Dairy.

The majority of the dairy farmers who ship fluid milk to Detroit have joined the Michigan Milk Producers Association, which is a cooperative bargaining agency of the farmers and represents the farmers in price and supply adjustments to the milk dealers in the city of Detroit. The membership in the producers' cooperative is over 15,000, 10,000 or more of whom ship milk to Detroit and the remainder ship to other urban areas in Michigan.

The Detroit market has a population of over 2,000,000 people. Other markets in Michigan supplied by producers who are members of the Michigan Milk Producers Association have a population of over 1,000,000 people. There are about thirty-three fluid milk dealers who distribute milk in the Detroit area.

The variation in supply of milk from season to season is a problem in the Detroit market as it is to most other large urban areas in the country. In an effort to correct this variation in the supply responses of producers, the Michigan Milk Producers Association has a price incentive plan designed to reduce supply variations seasonally. This plan is called the

FIGURE 2. LOCATION OF RECEIVING STATIONS IN RELATION TO TYPE-OF-FARMING AREAS IN THE DETROIT MILK SHED.



Type of Farming Areas:
1. Corn and Livestock
5. Dairy, general farming
6. Dairy, cash crops
7. Dairy, hay and special crops
8. Beans, sugar beets, and dairy

base-excess plan.

Prices received by the farmer and prices paid by the distributor are each calculated on a different basis under this plan. The distributors pay for the milk according to a use classification. That is, the distributors pay according to the percentage of their milk that goes into the different price uses, such as: fluid milk, cream, and condensery products.

Farmers are paid a base price for the milk delivered not in excess of their previously established base. The amount of milk upon which the base price is paid is established during the months of August, September, October, November and December by averaging the daily shipment of each producer for these five months. This base may be retained provided that the producer maintains an average daily shipment of not less than 90 per cent of his established base. A producer may assume a "new shipper" status to change his base. The base established by assuming the new shipper status would be calculated by multiplying his monthly average daily shipments by specified percentages for three months immediately following the shipper's declaration of intent to change to "new shipper" status.

The prices of the base milk and the excess milk to the farmer are calculated in the following manner. The base price is determined by the weighted average of the prices for the classes in which the base milk is used. The excess milk, that

milk delivered in excess of each individual's previously determined base, is priced at a considerably lower price than the base milk. The actual price to the producer for excess over base milk is determined by the average price paid by five different condenseries plus fifteen cents f.o.b. Detroit.

The base excess plan has been used in the Detroit milkshed since 1923.[1] Previous to the adoption of the base excess price plan, a flat rate was paid to producers. The variation in the price for all milk from season to season did little in regulation of supply between seasons. Unstabilized milk prices were very unsatisfactory to the distributor.

The base-excess plan had successfully reduced the seasonal variation of milk from producers until 1942, following which the percentage of milk shipped in the surplus months of the early summer over the milk shipped in the short period became greater (Fig. 3). Since 1942 and until 1948, the seasonal variation in production response has been increasing. Actual shortages of fluid milk for consumption purposes occurred during the fall and winter of those years.

There have been alternative price incentive plans proposed to reduce the seasonality of production in the Detroit market. These plans are in use in other markets throughout the

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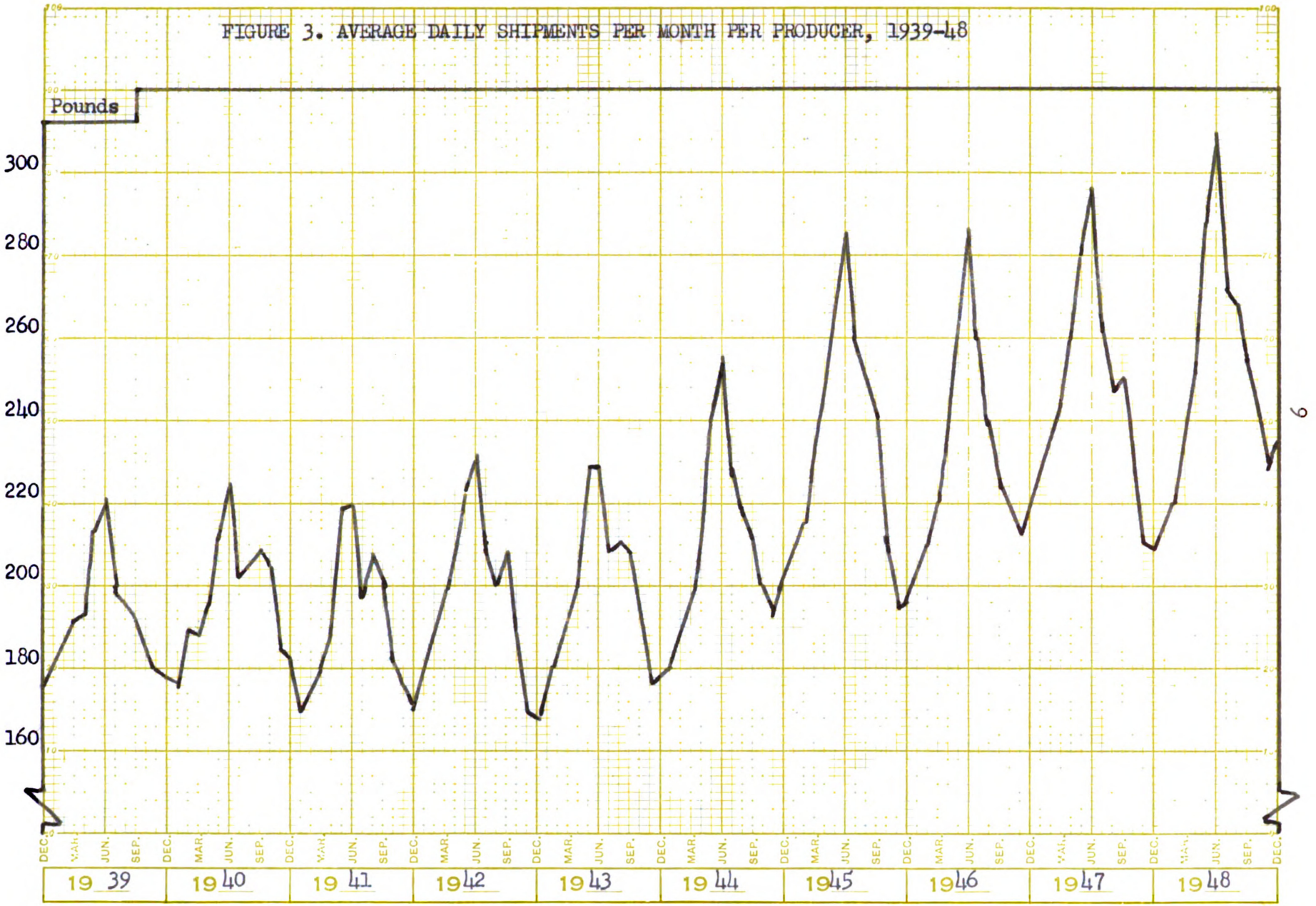
[1] J. T. Horner, "The Detroit Milk Market," Michigan Special Bulletin No. 170, (March, 1928), p. 30.

FIGURE 3. AVERAGE DAILY SHIPMENTS PER MONTH PER PRODUCER, 1939-48



country. In short, the alternative incentive plans can be described as: (1) The take-off and pay back plan, and (2) the seasonal differential plan.

The Louisville market has a take-off and pay back plan that is generally representative of this type of plan. In the Louisville market, the price of the highest of three basic formulas (butter-powder, butter-cheese and condensery) is selected. To this a fixed differential is added. In the spring, forty cents per hundred weight is subtracted from the blend price. This forty cents is put in the bank until the fall, and then is withdrawn in total and divided equally per hundredweight of milk shipped in during the fall months.

The seasonal differential plan also uses the highest of the three basic formulas (butter-powder, butter-cheese or condensery price). To this basic price the following amounts are added: seventy centy in the winter, fifty cents in the spring, seventy cents in the summer and ninety cents in the fall.

There are alternative measures within the framework of the base-excess price plan which could possibly be used to alleviate the short supply conditions in the fall and the early winter months. Three measures have been suggested. First, there is the possibility of enlarging the milkshed to provide adequate supplies of milk in the fall. This measure would pose problems of increased transportation costs, increased amounts of surplus

milk in the spring, and producer education in the fields of sanitation and the mechanism of the base-excess plan. Second, there is the alternative of buying emergency supplies in non-fluid markets. Again transportation costs and sanitation adjustments would be problems. A third measure would be to increase the price incentive for fall milk. This measure will be studied in another phase of the seasonal problem.

CHAPTER II

PROCEDURE

A representative random sample of the producers shipping fluid milk to the Detroit market through the Michigan Milk Producers Association was selected as the main source of data on scale of operations, seasonal production variation, and dispersion of location in the milkshed. The technique of obtaining the sample was a systematic sampling of the producer records from the files of the producer association. Beginning with a random number between one and twenty, every twentieth producer record was selected for study to determine the characteristics of the universe.

From this primary sample, a stratified sample was obtained by selecting every third producer record from a two-way distribution according to type-of-farming area and seasonal production variation. Only those producers showing the complete year's production during 1947 were used in the stratification.

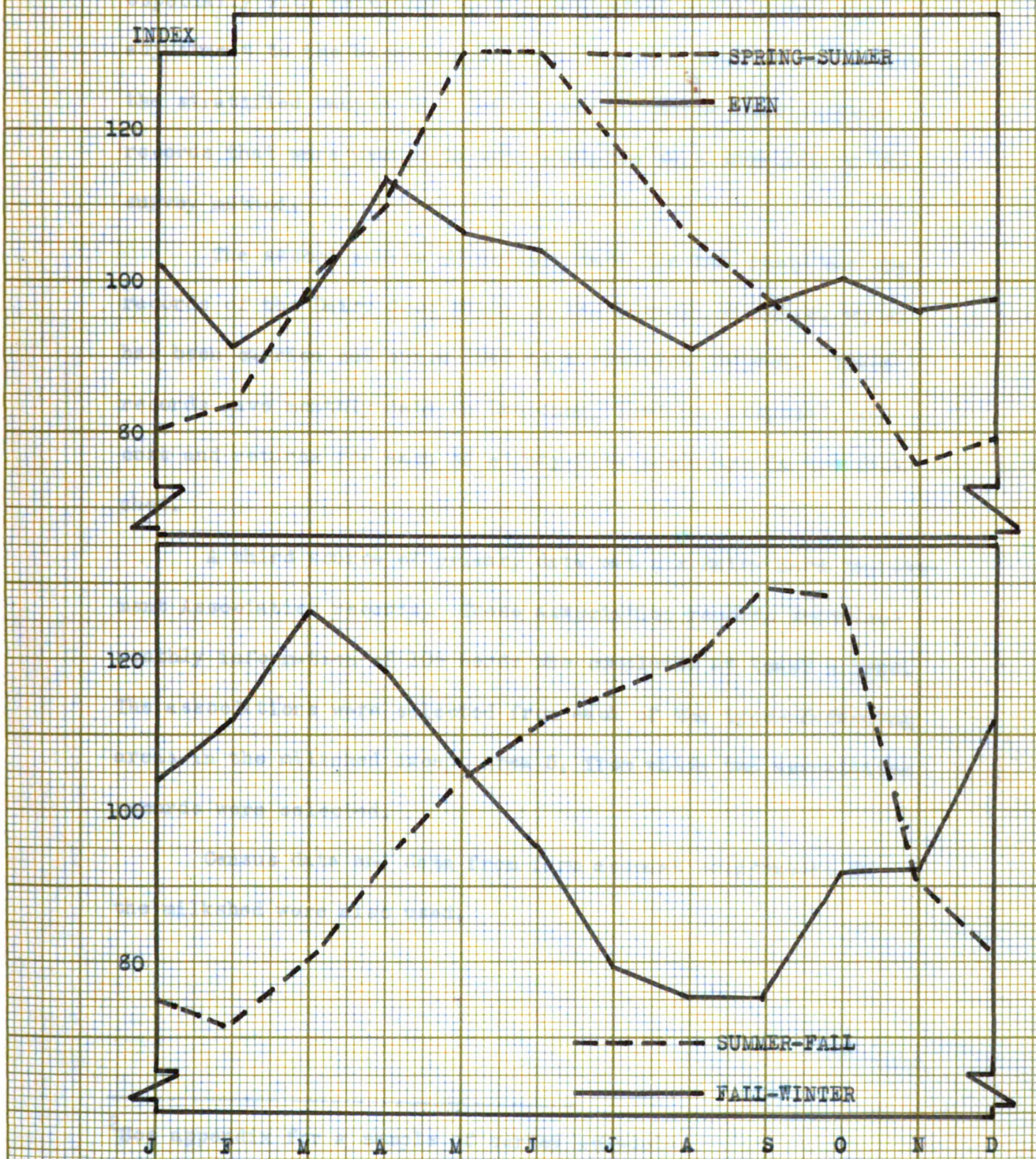
To determine the seasonal production variation for each producer, the record for the year was divided into four quarters based upon the seasons of barn feeding and pasture feeding. The first quarter includes the months of February, March and April. This is a period of barn feeding in the milkshed. The second quarter includes the months of May, June and July--a period

characterized by good pastures and high milk production. The third quarter includes the months of August, September and October--the period of the late pasture and a declining milk production for the milkshed. The fourth quarter includes the months of November, December and January. This quarter is a part of the barn feeding period and is the period of the lowest milk production.

The quarterly production for each herd was determined. From this a seasonality ratio was calculated by dividing the low quarter's production by the high quarter's production. An array was made of seasonality ratios. Those producers whose seasonality ratio was more than one standard deviation above the arithmetic mean of the distribution were classified as even producers. This meant that the quarterly production of the even producers did not vary from the high to the low by more than twenty-five per cent. To provide more significant results, in further analysis the two groups of producers were combined who had their high production quarter in either the November to January group or the February to April group, because of the similarity of the two quarters in the feeding program and because of the small number of producers which fell into each group. The production patterns of the four groups are illustrated in Fig. 4.

As the main source of data on the farm organization, the dairy herd practices and operations, and the farm operator,

FIGURE 4. MONTHLY INDEX OF PRODUCTION, FOUR SEASONAL PATTERNS, DETROIT MILK SHED, 1947.



especially with reference to his managerial ability and his adjustment to the base-excess plan, the producers selected from the stratified sample were interviewed.[2] About ninety-seven records that were usable in most analyses were obtained by the survey method.

The second source of primary data for the study was the records of the Dairy Cost Study in the Detroit Milkshed, which has been carried out since 1945 as a research project. These records gave monthly data on breeding, feeding, disposal, and cost and returns for each of eighty-five producers in the milkshed.

A third source of primary data was six Dairy Herd Improvement Association records. These association records contained monthly information of 108 herds who completed at least a year. The associations were selected from each of the type-of-farming areas in the milkshed except Area 5, from which two association records were selected.

Census data and data from farm account cooperators in the milkshed were also used.

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[2]See appendix for a sample of survey schedule.

CHAPTER III

CAUSES OF SEASONALITY OF MILK PRODUCTION

There are three important or basic causes of the typical seasonal milk production, as follows: (1) Changes in the amounts and the quality of feed during the year; (2) a natural tendency for spring freshening; and (3) variation in weather conditions. The basic causes of seasonality of milk production are generally accepted. They are stated here as hypotheses and will be supported in this chapter by data collected from secondary sources for the most part. The purpose of stating and supporting the important causes of seasonal milk production in this chapter is to clarify them from secondary causes, or lack of control at the farm level of such factors as the time of breeding, feed shortages, etc. The basic causes are those forces which must be controlled to obtain desired seasonal production patterns.

Changes in the Amounts and the Quality of Feed During the Year

There are differences in the amount of feed available to the dairy cow during different seasons of the year. The following table is a typical example of the variation in feed amounts available to a dairy cow. Of course, it must be realized that part of these differences in amounts is required because of

TABLE I. AMOUNTS OF FEEDSTUFFS FED PER COW ON A TYPICAL DAIRY FARM IN THE DETROIT MILKSHED, 1947

		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Concentrate mix	(lbs.)	196	175	189	200	218	275	296	274	259	208	161	182
Hay	"	660	660	600	600	476	-	-	-	-	-	659	694
Silage	"	900	900	864	864	634	-	-	-	-	-	750	789
Pasture* (acres per cow per month)						1.4	1.3	1.3	.23	1.3	1.3		

*Pasture during August was reed canary grass, the balance of the pasture was alfalfa-brome. The yield of the alfalfa-brome in hay equivalent per acre was estimated at 1 3/4 tons.

changes in the quality of the feedstuffs and changes in the nutrient requirements of the cattle in various seasons of the year. Changes in the grain ration in this case are an indication of the relative amount of milk production and they show a direct positive relationship.

Table I does not show any actual changes in quality of the feedstuffs through the various seasons of the year. But it is only a simple matter of conjecture to contrast the lush green pasture on most farms during the late spring and the early summer months with the dry hays, and in most cases some silage during the barn feeding period. Good early pasture furnishes high quality feed for dairy cows. Not only is the supply of nutrients liberal, but there is provided by good pasture succulence and palatability besides an ample supply of minerals and vitamins.[3] Summer and fall pasture, though, do not furnish such high quality feed, even though acreage may be increased, as any dairyman would substantiate. This should indicate that there are seasonal differences in both quality and quantity of the nutrient intake of a dairy cow.

To relate the changes in the amounts and the quality of feedstuffs during the year to the changes in milk production, the monthly milk sales to the Detroit market were contrasted with the monthly production responses of the experimental herd of the

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[3]F. B. Morrison, Feeds and Feeding, 20th ed., The Morrison Publishing Co., Ithaca, New York (1947), p. 573.

United States Department of Agriculture at Beltsville, Md.[4] The experimental herd at Beltsville has been entirely barn fed for years. The kinds and the quantities of the feeds given and the care and attention are the same throughout the year. The effect of the month of calving has been removed from the Beltsville experimental herd. Weather conditions were considered the only cause of the variation in milk production that did occur. The contrast of these two production responses shows that the changes in amounts, quality and kinds of feed available to the herds in the Detroit milkshed are at least partial explanation for their greater variation of production. It should be kept in mind that not all of the variation in production of the Detroit market supply above that shown for the Beltsville herd can be attributed to feed changes, but that part of it is due to month of freshening, the effect of which could not be removed from the Detroit supply records.

As further evidence of the effect that changes in feed have on variation of milk production, the supply responses of herds in the Dairy Herd Improvement Associations of California were contrasted with the supply responses of the herds shipping fluid milk to the Detroit market.[5] The D.H.I.A. herds of California were chosen because the weather conditions, at least

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[4] T. E. Woodward and E. Jensen, "The Influence of Season on Milk Production," U. S. Department of Agriculture, Washington, D. C., unnumbered mimeograph (February, 1942).

[5] Ibid.

FIGURE 5. INDEX OF MILK DELIVERIES BY MONTHS IN THE DETROIT MILK SHED AND AT THE BELTSVILLE EXPERIMENT STATION.

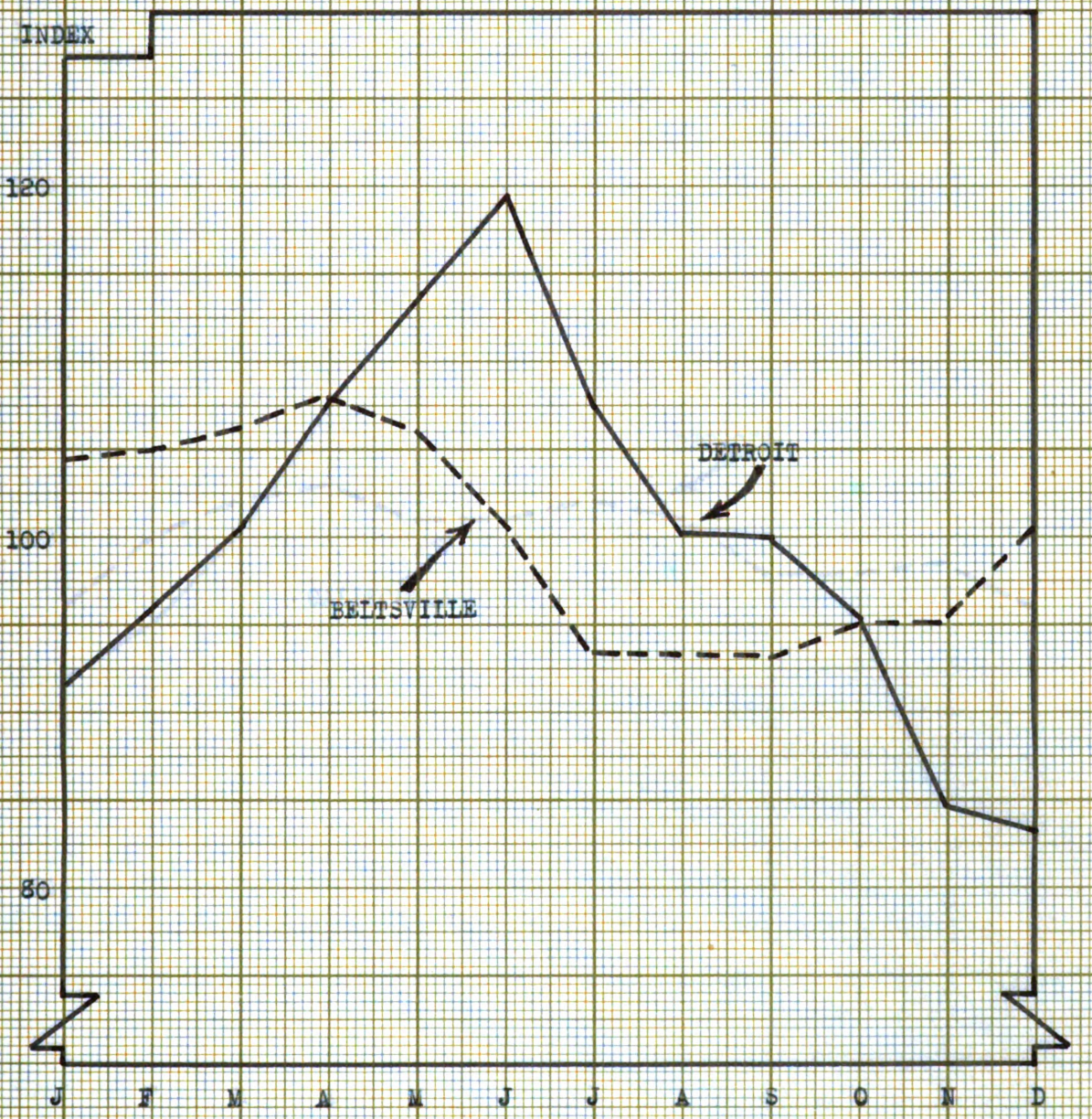
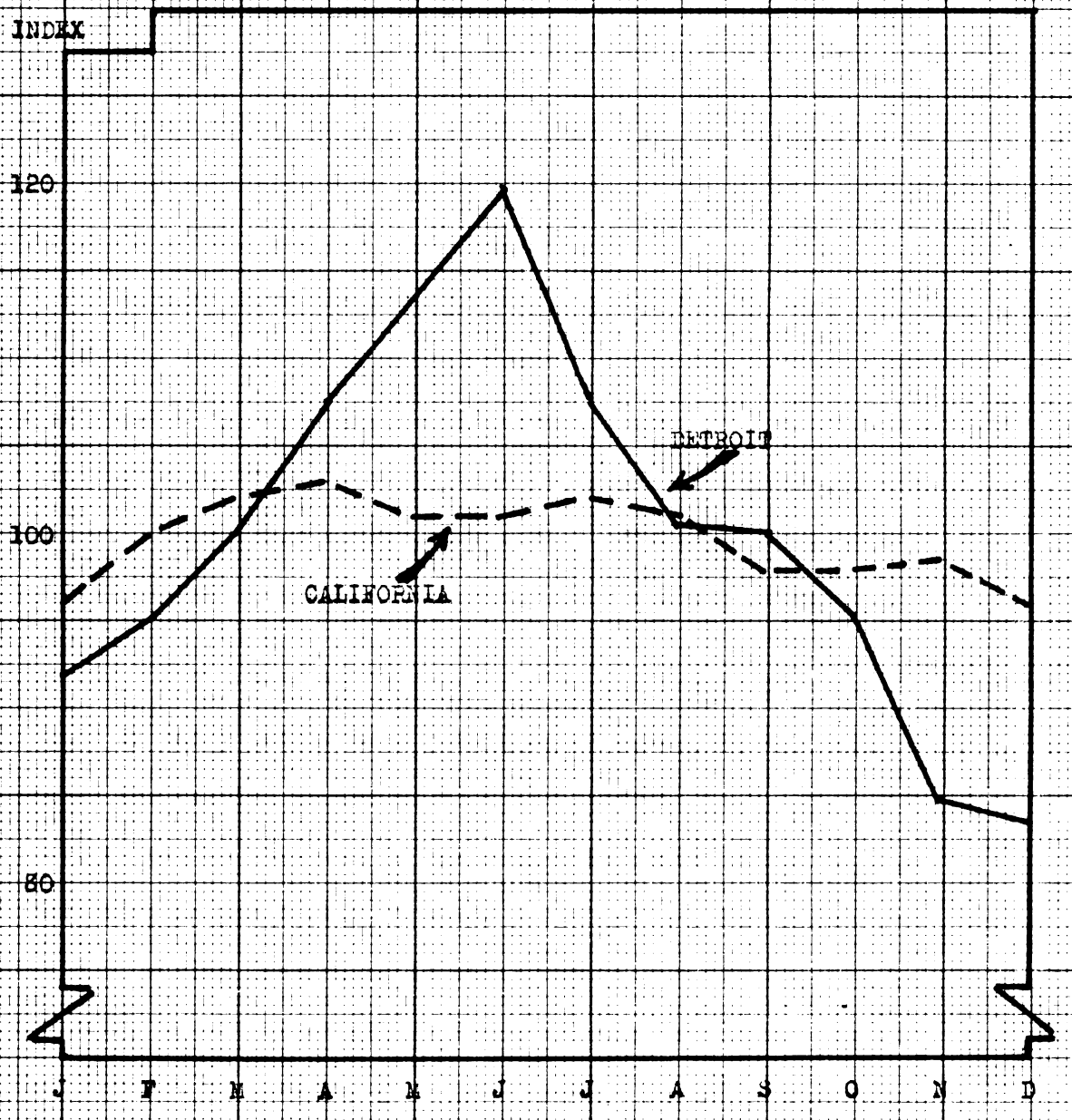


FIGURE 5a. INDEX OF MILK DELIVERIES BY MONTHS IN THE DETROIT MILK SHED AND THE CALIFORNIA D.H.I.A.



in terms of average monthly temperatures, are fairly stable. Also, probable good pasture throughout the season because of irrigation or rainfall, plus an abundance of good hay, should make it reasonable to expect fairly uniform production if these factors have an effect on production variation. The effect of the month of calving has been removed.

Fig.5a shows the milk production of D.H.I.A. herds in California contrasted with milk deliveries in the Detroit milkshed indexed by months. The difference in the degree of seasonality of production shown by these two production patterns should indicate, to a large extent, the effect of changes in weather conditions and changes in the amounts and quality of feed.

The Natural Tendency for Spring Freshening

If dairy cattle were permitted to revert to the wild state, the calving period would again shift to the spring of the year, as can be observed in the semi-wild state of beef cattle production in the West. It seems probable that the characteristic of spring freshening is still retained to some extent in the dairy breeds since all domestic animals were once wild and the instinct to have young in warm weather may be carried over. This spring freshening tendency is an important cause of the spring and early summer peak in milk production in fluid milk

markets. It is a factor that is not readily discernible. There has been little statistical work done with respect to this phenomenon, except that since the advent of the artificial breeding associations there has been interest created in the seasonal potency of bulls.

There seems to be agreement in the studies of the factors important to efficiency of breeding that the potency of semen from bulls is higher in the months of April, May and June, and lowest in the months of July, August and September. A study made by Erb, Wilbur and Hilton of the Purdue University Agricultural Experiment Station reveals an average breeding efficiency of 58.2 per cent in August as contrasted with 74.3 per cent in May from the records of the University herd from 1920 to 1940. The qualities of bull semen that are deemed important to efficiency of breeding are initial motility, semen volume, concentration of spermatozoa, number of abnormal spermatozoa, hydrogen ion concentration, period of sperm survival, and temperature.[6] According to the Purdue study, the above qualities of semen all showed seasonal variation except the hydrogen ion concentration. The average semen volume and average initial motility were least in July, August and September. The average concentration of spermatozoa and the total sperm per ejaculation were a maximum during

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[6]R. E. Erb, F. N. Andrews and J. H. Hilton, "Seasonal Variation in Semen Quality of the Dairy Bull," Journal of Dairy Science, Vol. 25, (1942), p. 825.

April, May and June. The average period of sperm survival was least in August, and lower during July, August and September than in any other months. The average number of abnormal spermatozoa was twenty-five per cent greater during July, August and September than during the next highest month of the year. No significant difference in the hydrogen ion concentration was evident seasonally.

To Michigan dairy herds, these data would be relevant after a time lag of from two weeks to a month because of the difference in latitude. In other words, the breeding efficiency of bulls in Michigan would probably reach its peak in June rather than in May.

These data lend support to the theory that there is a national tendency for spring freshening of dairy cattle which is a partial cause of high spring and early summer milk production. It might be argued that because the gestation period of cattle is nine months, a high breeding efficiency in June would cause the high milk production period to be in March, which is nine months later. There is a time lag of approximately a month or more before a cow reaches the peak of production, and pastures are at their best in May and June.

Variations in Weather Conditions

The summer peak in temperature comes at a time when milk

production is rapidly declining. Milk production is at the seasonal high during the spring and the early summer when the temperature is mild. Is there any relationship between extremes in temperature and milk production?

In an attempt to answer the question as to the effect of temperature on milk production, Regan and Richardson ran a controlled experiment with six cows.[7] The humidity, air movements and the ration were kept constant. Their results on the effect of varying the temperature on the milk yield per cow are given in Table II.

TABLE II. EFFECT OF TEMPERATURE VARIATION ON MILK PRODUCTION

Temperature Fahrenheit	Milk Production Pounds Per Day	Butterfat Per cent
40	29	4.2
50	28	4.2
60	27	4.2
70	27	4.1
80	25	4.0
85	20	3.9
90	20	4.0
95	17	4.3

[7] W. M. Regan and G. A. Richardson, "Reactions of the Dairy Cow to Changes in Environmental Temperature," Journal of Dairy Science, Vol. 21, No. 2, (1938).

Woodward and Jensen, in their study of the influence of season on milk production cited previously, showed that in the experimental herd at the Beltsville Station a difference of ten per cent in milk production between the low month and the high month was due to the variation in weather conditions (Fig. 5, p. 20).[8] This conclusion was reached after all the other factors that cause variation in milk production were removed or held constant through the year.

The implications should be clear in the effect of weather on Michigan dairying. The high temperatures beginning at the start of the summer season and continuing through August are a factor which influences production responses from dairy cows.

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[8] Woodward and Jensen, op. cit.

CHAPTER IV

THE RELATION OF FARM ORGANIZATION TO SEASONAL PRODUCTION PATTERNS

The previous chapter presented the basic causes of seasonal milk production. This chapter presents the farm organization differences associated with various seasonal patterns. The object is to show that these differences in farm organization are partially responsible for influencing a particular seasonal pattern.

Overcoming the causes of high spring and summer production is likely to result in increased costs. The increased costs arise from shifting production timing from the pasture season to barn feeding. Compensation over and above the increased cost by enough to induce the producers to shift to an even production pattern is the theory behind the price incentive plan contained in the base-excess plan.

It is assumed that even production under the base-excess plan is desirable and profitable from the producer's standpoint. An attempt will be made in this chapter to find indications from farm organization characteristics that this assumption may not be true on all farms. The problem of the profitability of the various types of production patterns on various types of farms is being studied elsewhere.

Type of Farming Areas

The differences in seasonal milk production by the type-of-farming areas in the Detroit milkshed were slight (Fig. 6). All areas showed a definitely high period of production in the spring-summer months with characteristically low production in the months of November and December.

Only some slight increase can be noted in the index of production by the area 7 producers during the summer months over the index of production by the producers in other areas. The difference is slight, but an effort was made to determine why it did occur. An analysis was made of the differences in size of herd, size of farm, importance of the dairy enterprise, seasonal distribution of labor, and land use. The only significant difference that occurred between type-of-farming areas in regard to these factors was in the land use. This factor will be taken up more completely in a following section of this chapter to explain why it is important in influencing seasonal milk production.

Areas 5 and 6 are relatively the most important of the type-of-farming areas in the milkshed (Table III). The differences in seasonal production shown by the other areas with the possible exception of area 7 would be of little importance to the Detroit market, as areas 5, 6 and 7 contain over eighty per cent of the shippers and ship more than eighty per cent of the milk.

FIGURE 6. INDEX OF AVERAGE DAILY SHIPMENTS PER PRODUCER, BY MONTHS, BY TYPE-OF-FARMING AREA, DETROIT MILKSHED, 1947.

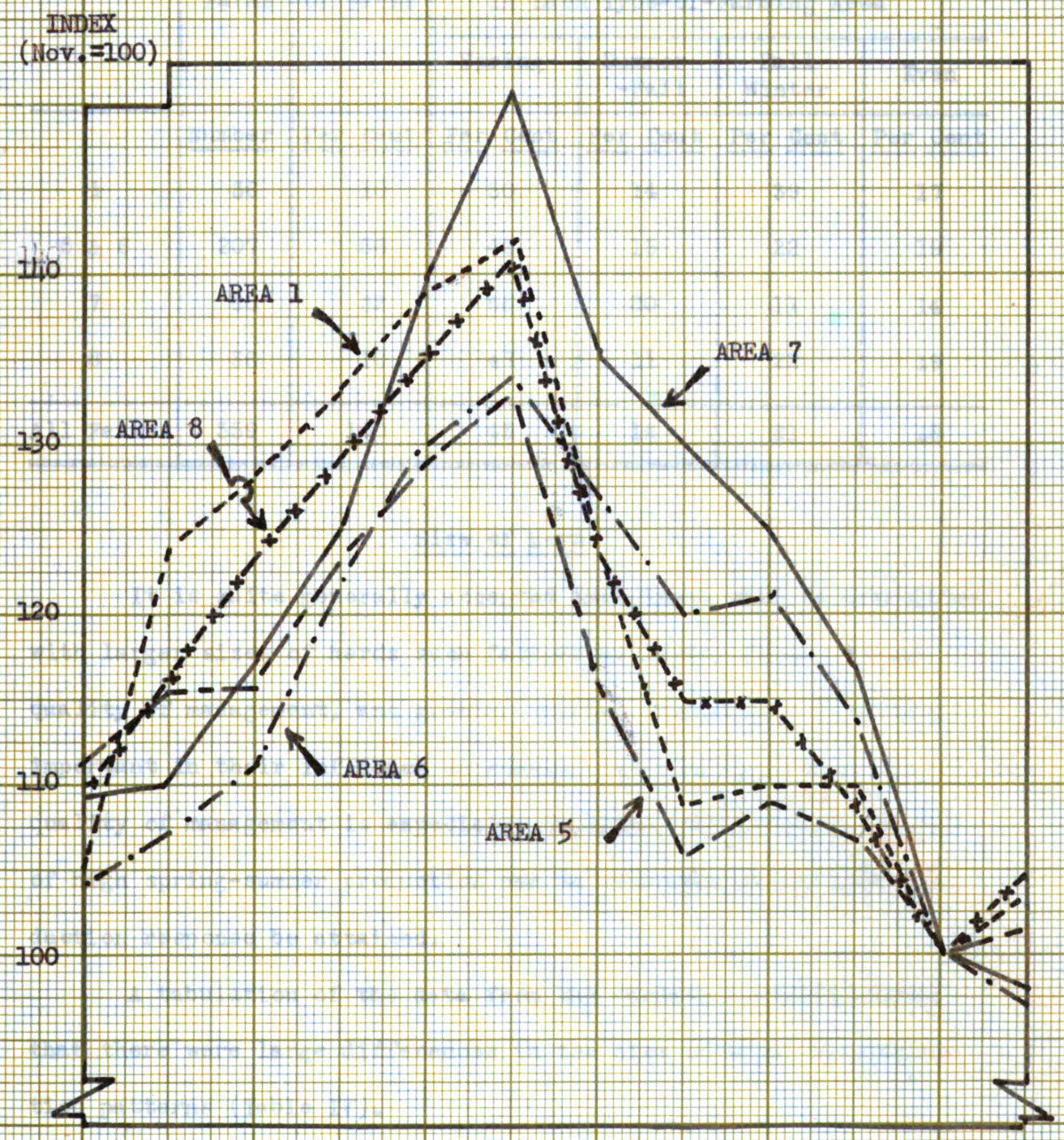

TABLE III. DISTRIBUTION OF FARMS IN THE MILKSHED BY PRODUCTION PATTERNS AND TYPE-OF-FARMING, 359 SAMPLE PRODUCTION RECORDS, DETROIT MILKSHED, 1947

Area	No. of Farms	Per Cent of Farms	Proportion of Producers in Pattern in Each Type-of-Farming Area			
			Spring-	Summer -Fall	Fall-Winter	Even
	Number	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent
1	36	10	30	14	39	17
5 & 6	207	58	44	15	22	19
7	80	22	55	20	11	14
8	36	10	47	11	22	19
All Farms	359	100	45	16	21	18

Size of Herd

It is quite generally accepted that there will be associated with larger sizes of herds such factors as larger farms, better quality of management, and greater capital resources. These are important in their influence on seasonal milk production. The quality of management is especially important if the basic causes of high spring-summer production can be overcome and an even production response be attained.

A tabulation of the data from the farmers surveyed showed that there were large differences in the size of herds by production patterns (Table IV).

TABLE IV. SIZE OF HERD BY PRODUCTION PATTERN, 97 SURVEY FARMS IN THE DETROIT MILKSHED, 1947

Seasonal Pattern	No. of Farms	Average Size of Herd
	Number	Number
Spring-Summer	47	14.4
Summer-Fall	15	10.6
Fall-Winter	15	13.2
Even	20	20.3
All Farms	97	14.9

The size of herd is important mainly as it is associated with other factors that are important in controlling production timing. Size of herd in itself is important in reducing seasonality by minimizing the effect of a loss of cows during the year. For example, a farmer with a herd of ten cows would experience a greater change in milk shipments if a cow were removed from the herd than if he had had twenty cows.

Relative Importance of the Dairy Enterprise

The relative importance of the dairy enterprise to the rest of the farm in competing for management and labor is important in controlling the milk production timing, if it is accepted that relatively more management and more labor are required to

shift the production timing, from forces that give rise to a spring-summer type of production pattern to an even type of production pattern.

The relative importance of the dairy enterprise to the rest of the farm was measured by the productive man work units[9] required for the dairy and for the balance of the farm. The results of the tabulation show that the dairy enterprise was of much greater relative importance on the farms producing an even milk pattern than on the farms producing in a spring-summer pattern (Table V).

TABLE V. IMPORTANCE OF THE DAIRY ENTERPRISE TO THE BALANCE OF THE FARM BY FARMS IN TWO SEASONAL PATTERNS, 64 SURVEY FARMS IN THE DETROIT MILKSHED, 1947

Seasonal Pattern	No. of Cases	Average Productive Man Work Units Per Farm		Proportion From Dairy
		Total	From Dairy	
	Number	Number	Number	Per Cent
Spring-Summer	44	516	245	47.4
Even	20	497	315	63.5
All Farms	64	510	267	52.4

As a general conclusion, it can be stated from the foregoing analysis that the larger and the more specialized dairy farms have a tendency to produce milk more evenly than those not as large or not as specialized.

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[9]Productive man work unit is the amount of work that the average man can do in a ten hour day.

Size of Farm and Land Use

Size of farm is important in its influence on production timing insofar as the larger farms would have more capacity for raising crops to feed dairy cows with which to control uneven production. A tabulation of size of farms by seasonal patterns shows little difference between the spring-summer and the even production pattern (Table VI). There is a definite difference between these two patterns and the summer-fall and fall-winter patterns.

TABLE VI. SIZE OF FARM BY PRODUCTION PATTERNS, 97 SURVEY FARMS IN THE DETROIT MILKSHED, 1947

Seasonal Pattern	No. of Farms	Acres per Farm		Proportion Tillable
		Total	Tillable	
	Number	Number	Number	Per Cent
Spring-Summer	47	194	160	82
Summer-Fall	15	135	111	82
Fall-Winter	15	145	108	74
Even	20	200	143	72
All Farms	97	178	137	77

An important difference between farms in the various patterns is in the use that is made of the land and also the intensity of its use. The spring-summer producers had 19.8 per cent of their total land in feed grain crops compared to 27.5 per cent by the even producers (Table VII). The former had about 50 percent

TABLE VII. LAND USE BY FARMS IN PRODUCTION PATTERNS, 97 SURVEY FARMS IN THE DETROIT MILKSHED, 1947

Land Use	Proportion of Total Acres by Production Patterns			
	Spring-Summer	Summer-Fall	Fall-Winter	Even
	Per Cent	Per Cent	Per Cent	Per Cent
Tillable:				
Corn for Silage	5.0	3.5	3.9	6.0
Corn for Grain	6.8	7.1	8.7	9.1
Oats	7.7	7.6	8.0	10.3
Barley	.3	-	1.0	.7
Soybeans	-	-	-	1.4
Wheat	10.3	12.4	9.5	9.6
Field Beans	5.3	3.6	2.0	.7
Hay:				
Alfalfa	10.2	8.5	9.7	7.2
Clover	1.3	2.6	1.5	2.6
Mixed	7.6	5.6	5.6	6.1
Timothy	.4	.6	.3	-
Other Crops	1.5	.7	.8	.9
Pasture	21.1	18.2	14.4	14.5
Summer Fallow	1.2	.4	2.4	1.8
Idle	3.5	.4	.7	1.5
Non-tillable:				
Pasture	11.0	7.3	14.3	18.2
Woods (not past.)	4.4	8.1	4.0	6.1
Farmsteads, Roads, etc.	2.4	3.1	2.8	3.2

more of their land in cash crops (wheat, field beans and "other crops"), as did the even producers. They had 51.6 per cent of their land in hay-pasture crops compared to the even producing farms' 49.5 per cent. These differences would indicate that the spring-summer producers have less feed grains for the maintenance of an even production pattern than the even producers; or, phrased differently, their cows would be producing on relatively more roughages than the even producers. It was explained in Chapter III that roughages vary greatly in milk producing potential through the year, especially between early pasture and barn fed hay. Therefore, it would appear that part of the seasonal difference between these dairies is due to differences in crops grown.

As was indicated in the section on the relative importance of the dairy enterprise, the spring-summer producers raise relatively more cash crops than even producers. This only lends support to the previous statements in that section.

The spring-summer dairies were not as intensive in their farming operations as were the other dairies. Intensity is important in obtaining high income and in providing year around labor distribution. A tabulation was made to find the tillable acres per productive dairy unit as a measure of intensity between the farms in the various production patterns. The results showed that the spring-summer dairies had 11.1 tillable acres per cow

compared to 7.0 on the part of the even dairies. The other two patterns fell between those mentioned. Productive dairy units were used as a measure rather than the measure "productive animal unit", because there were no significant differences between the patterns in animal units other than dairy cows.

At the beginning of the Chapter on differences by type-of-farming areas, it was shown that farms in area 7 produce milk relatively more seasonally than the other patterns. It was found in analyzing the differences in land use by type-of-farming areas that area 7 followed the land use pattern shown in Table VII for the spring-summer dairies much more closely than any of the other type-of-farming areas. Area 7 producers like the spring-summer producers had more cash crop acres (especially beans), less feed crop acres, and more land in hay and pasture than the farms in other areas.

Labor Requirements

Farms in the Detroit milkshed show three periods of concentrated demand for labor; they are: (1) The spring planting season, reaching a peak in April; (2) corn planting, hay and grain harvesting period in the months of June and July; and (3) the corn harvest and fall plowing period in September, October and November (Fig. 7). There are some differences depending on the difference in the proportion of crops raised. A greater

percentage of the farm in corn would require greater amounts of labor in the fall, whereas a greater percentage of the land in small grains and hay would require more labor in the summer. These differences are important to the type of seasonal milk production pattern. A spring-summer type of pattern would be more competitive for labor on a small grain-hay type of farm than on a corn-livestock farm. The opposite would hold true for a peak fall producing dairy. Furthermore, a spring-summer type of dairy would be more competitive for labor in any month except during the winter, when there is a relative surplus of labor, than would a winter type of dairy.

A winter dairy would give the optimum use of the labor resources on the dairy farms in the milkshed. An even producing dairy would be somewhat more competitive for labor in the summer and fall than a winter dairy, but yet give much better labor distribution than either a spring-summer dairy or a summer-fall dairy.

Buildings and Equipment

There is a relationship between the condition of the buildings and the condition and amount of milk handling equipment to the seasonal pattern of production. The even producers had much more of their milk handling equipment in the "good" classification than any of the other patterns. Most of the fall-winter

FIGURE 7. HOURS OF LABOR REQUIRED PER FARM, IN THE DETROIT MILK SHED, 1947.

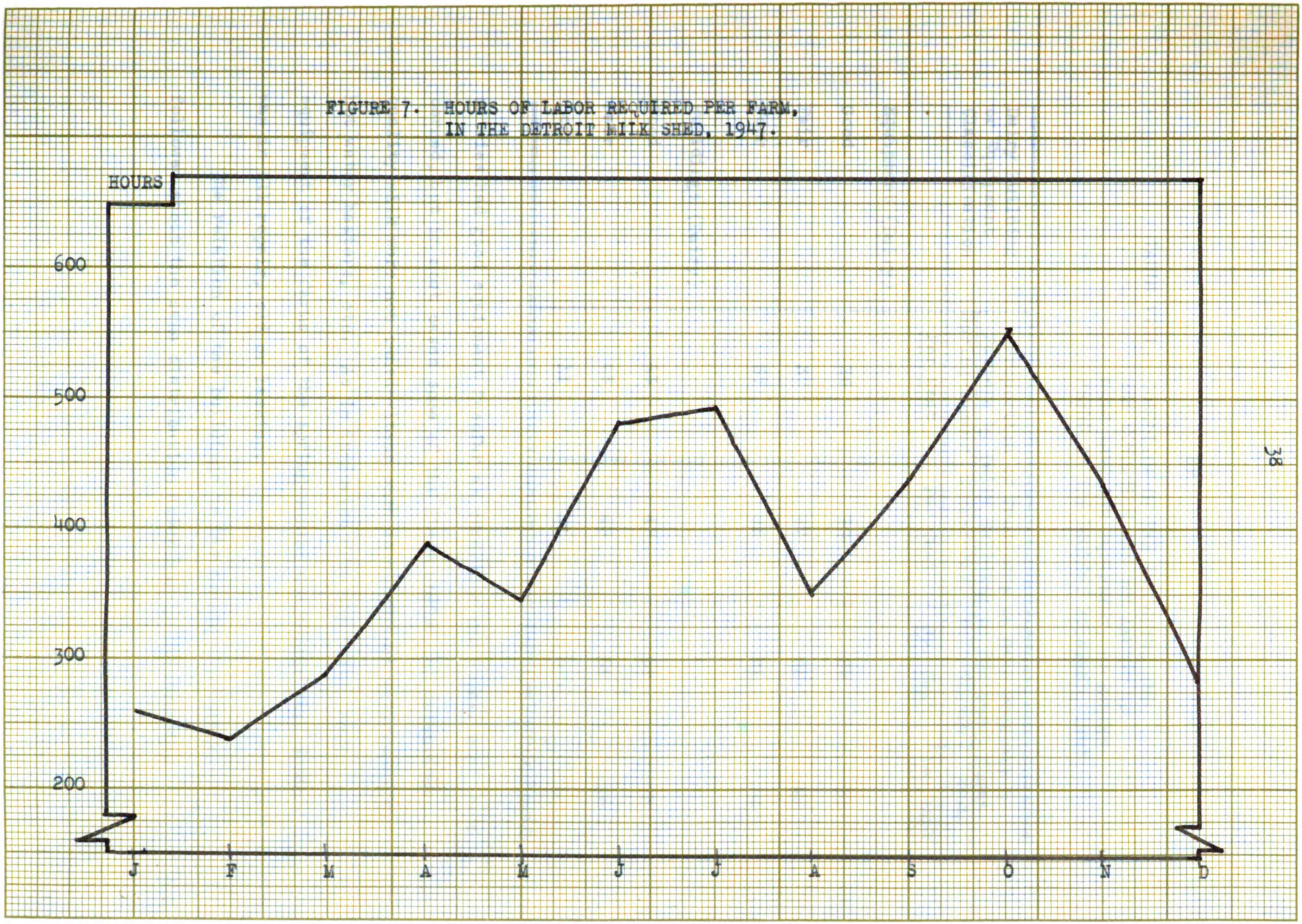

TABLE VIII. CONDITION OF THE BUILDINGS AND THE CONDITION AND THE AMOUNT OF MILK HANDLING EQUIPMENT, 97 SURVEY FARMS IN THE DETROIT MILKSHED, 1947

Dairy Building or Equipment Classification	Proportion of Producers in Each Production Pattern by Dairy Building or Equipment Class			
	Spring-Summer	Summer-Fall	Fall-Winter	Even
	Per Cent	Per Cent	Per Cent	Per Cent
Equipment (Dairy)				
Good	26	20	27	50
Fair	37	27	46	45
Poor	37	53	21	5
Buildings (Dairy)				
Good	43	47	67	75
Fair	46	40	33	25
Poor	11	13	-	-

dairies had good equipment insofar as condition and repair were concerned, but in most cases some of the items needed for producing quality milk were not owned--items such as electrical milk coolers, hot water heaters, etc. As is indicated from the table, much equipment of the farms of the spring-summer and summer-fall types was in ill repair, old or lacking.

The relation of the buildings to the seasonal patterns followed about the same distribution according to the building

classifications as in the equipment analysis.

To eliminate bias, the appraisal of the buildings and equipment was done by the enumerator before he had knowledge of the particular seasonality pattern in which the farm was grouped.

CHAPTER V

EFFECT OF DAIRY HERD MANAGEMENT PRACTICES ON SEASONALITY OF MILK PRODUCTION

It is in the field of management that the dairy farmer can make decisions which will have an effect on the milk production timing of his herd. In the previous chapter, it was indicated that the individual farmer may be limited in his choice of enterprises by natural conditions not directly under his control, as many herd management practices are. These herd management practices, which are largely short run decisions and which will be analyzed in this chapter, come under the main headings of breeding practices and feeding practices.

Breeding Practices and Problems

The breeding timing very obviously influences the production timing response of a herd. The milk production curve of a dairy cow characteristically begins falling off about thirty days after freshening at a rate of approximately twelve per cent per month until the dry period. In other words, sixty per cent or more of a cow's total production comes in the first five months of a ten month lactation period. This is important for the dairyman to know if he is trying to regulate his milk production timing by freshening his cows at strategic months in the year.

To graphically show how the season of freshening affected the milk production timing of eighty-five Dairy Cost Study Herds in the Detroit milkshed, the following figures are shown. The figures show the index of monthly milk production and the index of the number of calves born by months. An index of the number of calves born by months is the same as saying the index of the number of cows freshening by months.

Fig. 8 shows the index of the number of calves born and the index of monthly milk production for all eighty-five herds in the cost study. The figures following show the effect of time of freshening on milk production timing for herds in the spring-summer and even milk production patterns. In all figures it is quite evident that the season of freshening does affect the production pattern. A tendency is shown for freshenings to occur to the greatest extent during the period of January, February and March and the period in the early fall of August, September and October. But when comparing the freshening dates of the herds in the even production pattern with the herds in the spring-summer production pattern, it can be easily seen that the even producers have relatively more cows freshening in the latter period, or August, September and October, than the spring-summer producers who have relatively more cows freshening during the first half of the year.

Another characteristic that can be noted from the follow-

ing figures is the lag of a few months between the month of cow freshening and the high period of milk production. This is explained by the fact that it takes a month or more for a cow to reach full production after calving.

From D.H.I.A. data it was possible to obtain the total number of cows in the herd, the number of cows dry, and the number of cows milking by months (Fig. 11). These data were arranged, seasonal production patterns to show differences in the following characteristics: (1) Monthly variation in cow numbers; (2) monthly variation in the number of cows being milked; and (3) relative differences in the average dry period.

Monthly variation in cow numbers was not great except in the summer-fall seasonal pattern. The variation that did occur is primarily a result of selling cows when the trend in cow numbers was downward and replacing with fresh heifers when cow numbers were increasing, since cow purchases for replacement only averaged about one cow per farm for the year.

The monthly variation in the number of cows milked is closely associated with the milk production peak in each of the seasonal patterns. And further, as would be expected, all seasonal patterns, except even, have a large variation in the number of cows milking. The even producers had a fairly constant number of cows milking throughout the year, although they did reach a seasonal low in number of cows milking and in total

FIGURE 8. INDEX OF CALVES BORN AND MILK PRODUCED BY MONTHS, 85 DAIRY COST STUDY HERDS, 1947.

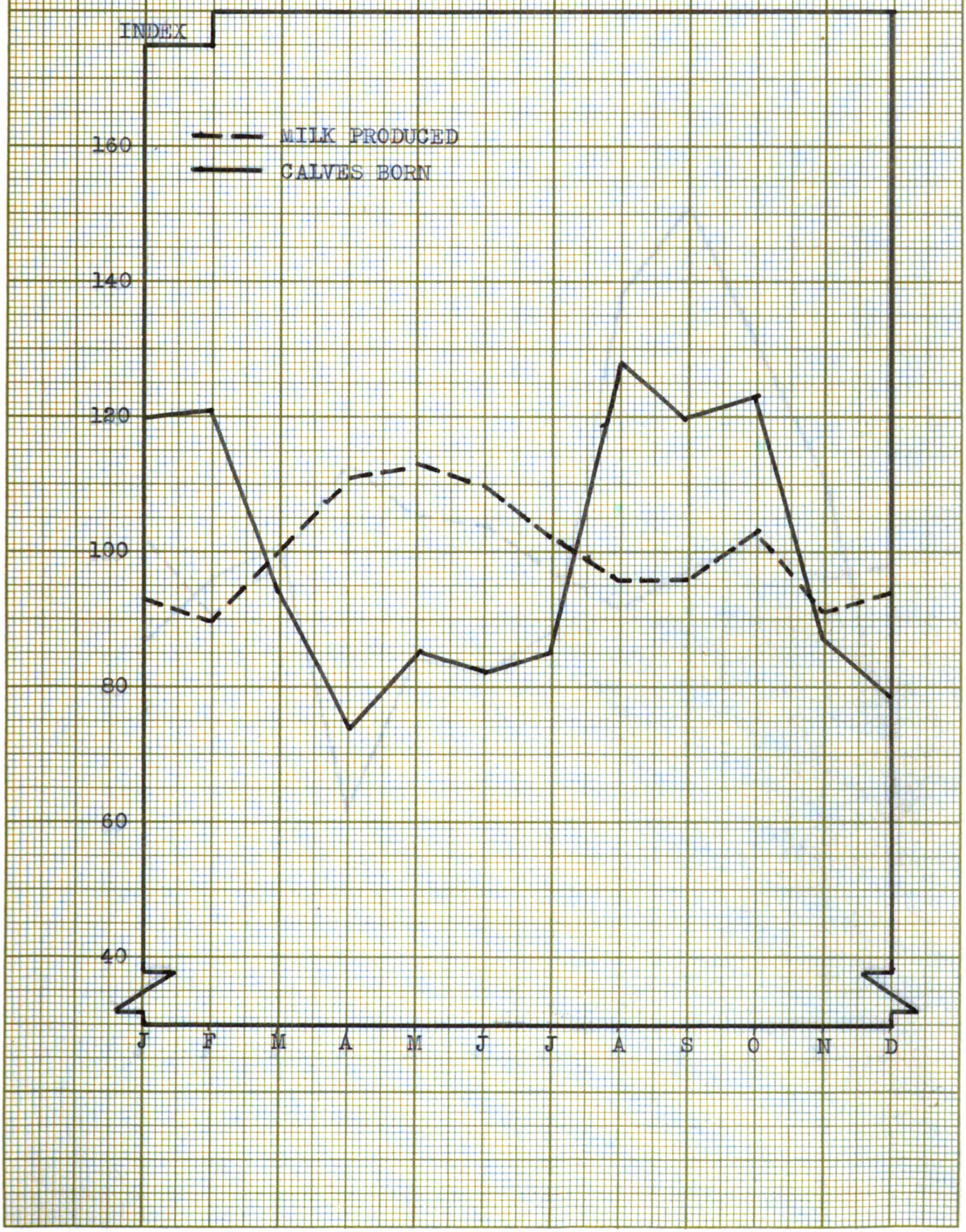

FIGURE 19. INDEX OF CALVES BORN AND MILK PRODUCED PER MONTH BY EVEN PRODUCERS, 33 DAIRY COST STUDY HERDS, 1947

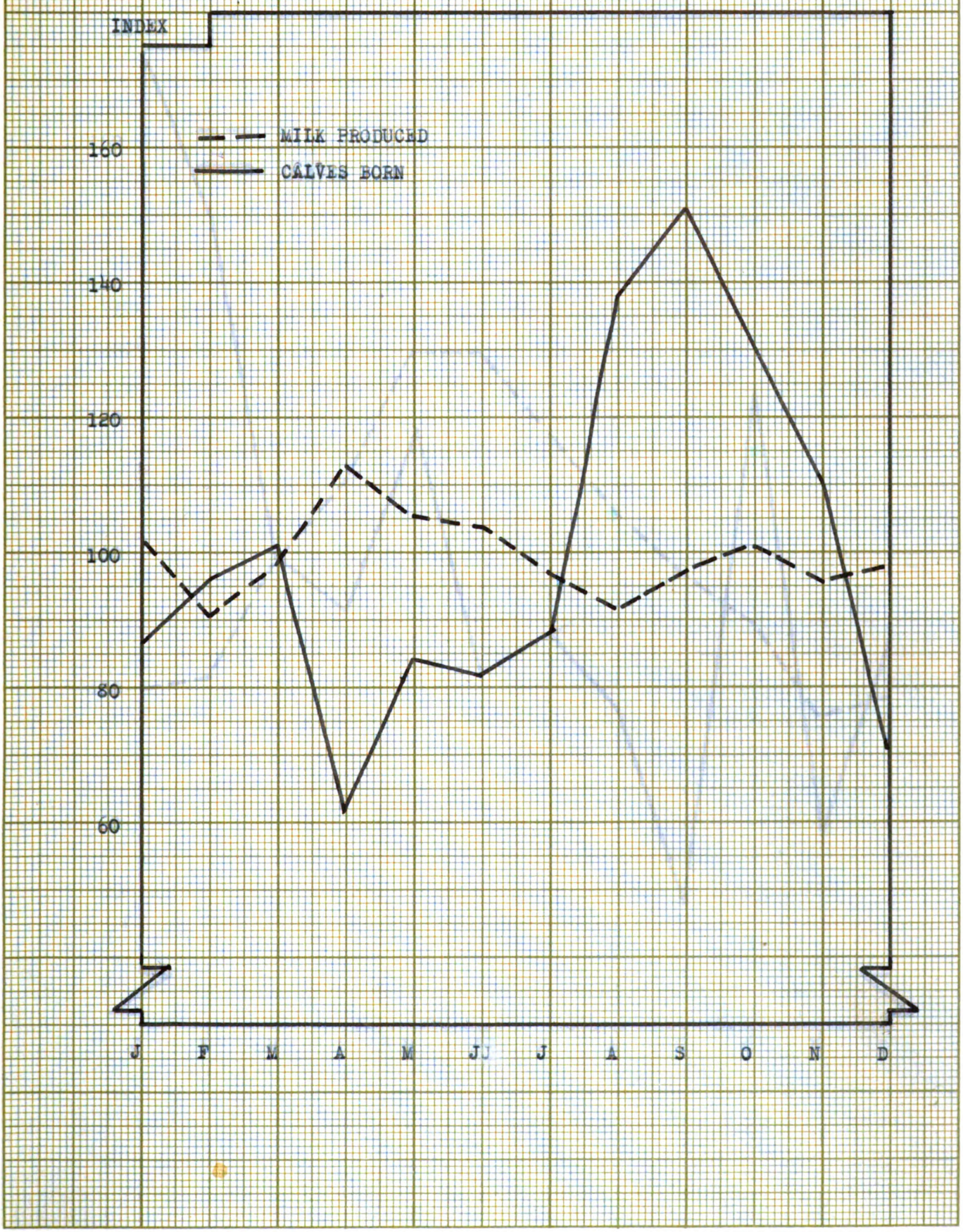

FIGURE 10. INDEX OF CALVES BORN AND MILK PRODUCED PER MONTH BY SPRING-SUMMER PRODUCERS, 23 DAIRY COST STUDY HERDS, 1947

number of cows in June. This would indicate culling and disposal of cows during and previous to June.

As is indicated from the difference between the number of cows in the herd and the number milking, the average percentage of cows dry by months in each of the patterns is as follows: spring-summer, 15.8; summer-fall, 15.9; fall-winter, 18.1; and even, 14.2. The reason for the difference in percentage of the cows dry will be explained in the following section of this chapter.

Production per cow.- Assuming average management in all production patterns, herds in the fall-winter production pattern would show less production per cow than herds in the spring-summer type of pattern. This would seem contrary to published data which show the association of month of calving with production per cow; the results of which indicate that production per cow is greater in the case of cows freshening in the fall and early winter than those freshening in the spring and summer.[10,11] These data are not conflicting from a research standpoint, but the data cited, if applied by the average dairy farmer, would be misleading. The explanation lies in the source and the tabulation difference. The data cited are a tabulation of individual cow records which do not show herd averages and, therefore, have

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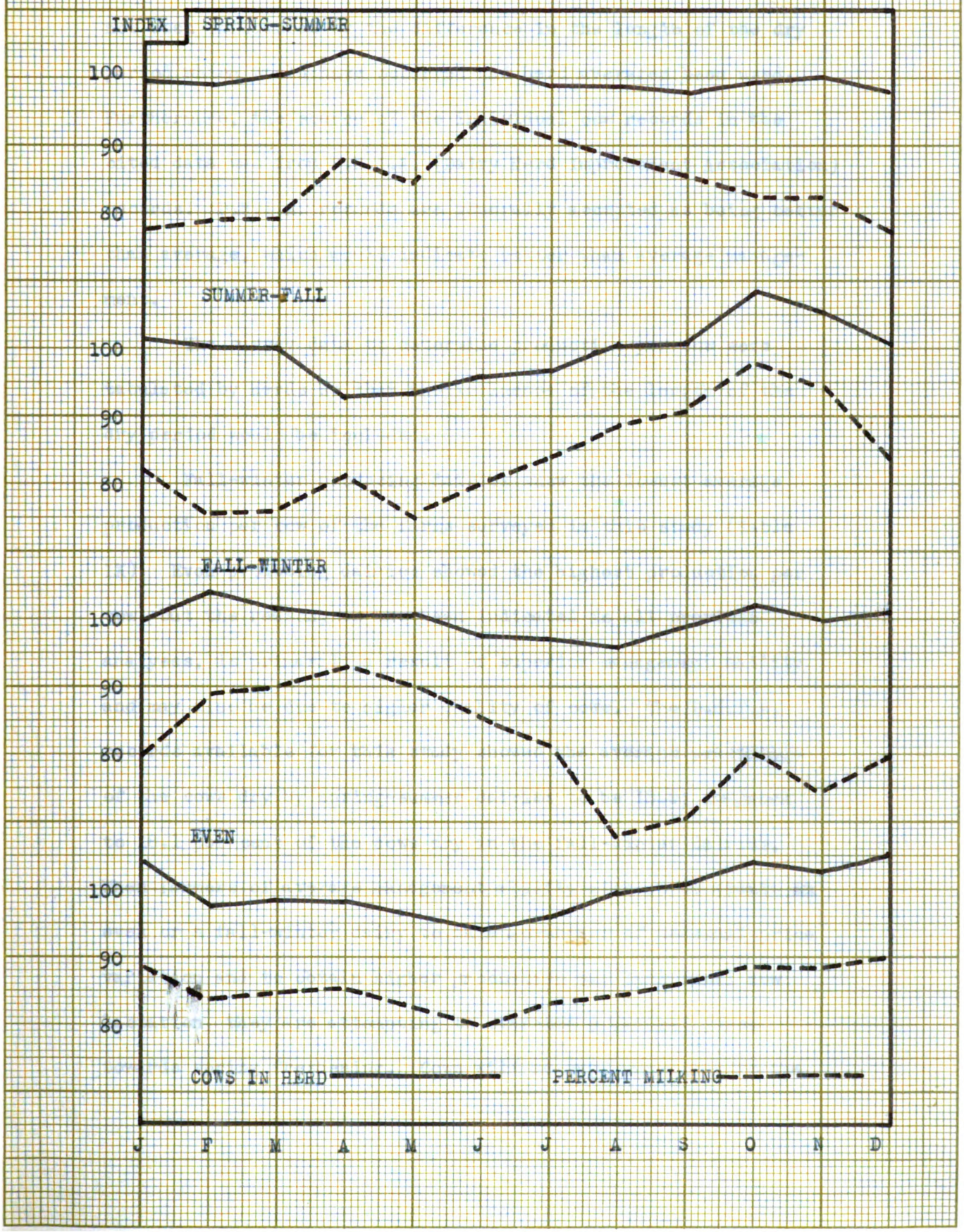
[10] T. E. Woodward, "Some Studies of Lactation Records," Journal of Dairy Science, Vol. 29, (1945).

[11] "Factors Affecting Seasonal Milk Production and Their Effect on Producers Costs and Returns," Report of Subcommittee I, Maine Agr. Exp. Sta. Bulletin 459, (April, 1948).

FIGURE 11. INDEX OF COWS IN HERD AND PERCENT MILKING BY SEASONAL PRODUCTION PATTERN, 108 D.E.I.A. HERDS, 1947.



not been influenced by the difference in the length of the dry period which would have occurred had herd averages been used. Furthermore, the source of the individual cow records in the cited data was from D.H.I.A. (Dairy Herd Improvement Association) records. D.H.I.A. records are generally accepted as being better than average, which would indicate better than average management.

The survey data to determine production per cow were tabulated by herds so that the influence of the length of the dry period would be included.

Fall-winter producing dairies show the lowest average production per cow of the farms surveyed in this study (Table IX). Even producing dairies showed the highest production per cow, but the reason, as has been indicated in all previous analyses, is primarily a result of superior management ability and may also be due to higher quality of cows. The D.H.I.A. records available for this study showed the average percentage of the cows dry by spring-summer dairies to be 15.9, compared to 18.1 per cent of the cows dry in the fall-winter dairies. When farmers of average management ability attempt to attain an even or a fall-winter dairy to take advantage of seasonal price variation and to obtain higher production per individual cow lactation, they are attempting to overcome a natural force towards spring freshening. Cows will be dry longer due to the

TABLE IX. MILK SHIPPED PER COW BY PRODUCTION PATTERNS, 97 SURVEY FARMS IN THE DETROIT MILKSHED, 1947

Seasonal Pattern	No. of Farms	Average Production Per Cow
	Number	Pounds Milk
Spring-Summer	47	6,410
Summer-Fall	15	6,859
Fall-Winter	15	5,559
Even	20	7,042

added difficulties of breeding during the barn feeding period compared to breeding during the summer pasture season.

Breeding decisions.- The reasons why dairy farmers freshen cows when they do are many and varied. In the interview schedule, several questions were devoted to finding out why farmers freshened their cows when they did. The information received even then was not complete. The following table shows the results of their answers to queries about their reasons for decisions as to the time of breeding. The question to which the farmers answered was phrased as follows: "How do you decide when to have your cows bred?"

TABLE X. DECISIONS AS TO TIME OF BREEDING COWS BY PRODUCTION PATTERNS IN 97 SURVEY HERDS, DETROIT MILKSHED, 1947

Deciding Factor	Proportion in Pattern			
	Spring-Summer	Summer-Fall	Fall-Winter	Even
	Per Cent	Per Cent	Per Cent	Per Cent
With Bull on Pasture	6	5	4	-
Soon after Freshening	42	42	25	47
To Obtain Fall Freshening	48	43	63	43
To Obtain Freshening in Other Seasons	4	10	8	10

The reactions of the spring-summer and the summer-fall producers were very similar.

There was no similarity in the answers of the fall-winter production pattern to the other groups. The fall-winter group gave the answer "to obtain fall freshening" in the greatest percentage of cases. Nothing especially significant was apparent from the answers given by the even producing group. Their answers were quite comparable with the spring-summer and summer-fall groups except that none of them let their bull run with the cows. Their interest seemed mainly in getting cows rebred.

A question designed to determine the reasons why dairy farmers had their heifers bred when they did was also asked.

This question was proposed because it was realized that the breeding program of the mature cows in the herd would not give the complete picture, as on the average a dairy herd has a complete turnover every four years.[12] This means that approximately twenty per cent of the herd is made up of first-calf heifers. The season of the year in which a majority of these heifers entered the herd is especially important to the seasonality of milk production because of the influence on the milk production pattern when a fresh cow enters the herd and because in following years her freshening date would be approximately one year from the date of her previous freshening.

The following table is essentially the same as the previous table on the reasons for the breeding date of cows.

TABLE XI. DECISIONS AS TO TIME OF BREEDING HEIFERS BY PRODUCTION PATTERNS FROM 97 HERDS IN THE DETROIT MILKSHED, 1947

Deciding Factor	Percentage in Pattern			
	Spring-Summer	Summer-Fall	Fall-Winter	Even
With Bull on Pasture	7	5	11	-
According to Age or Size	55	60	39	47
To Obtain Fall Freshening	38	35	50	53

[12] W. H. Vincent, "Dairy Costs and Returns in the Detroit Milkshed," Mich. Agr. Exp. Sta., Mimeo. F.M. 434, (1948).

Note particularly that the spring-summer producers and the summer-fall producers give the answer "according to age or size" in over fifty per cent of the cases, while the fall-winter producers and the even producers gave answer "to obtain fall freshening" in the majority of the cases. It is evident that the fall-winter producers and the even producers put more stress on the time of freshening heifers for the purpose of maintaining their respective production patterns than do either the spring-summer or the summer-fall groups.

To determine what actually happened in these herds with respect to the time of heifer freshening to see if the answers given were in line with the timing of freshening heifers, a tabulation was made by production patterns of the percentage of first-calf heifers added to the herd during the last half of the year (Table XII).

TABLE XII. NUMBER OF FIRST-CALF HEIFERS ADDED TO THE HERD AND THE PROPORTION ADDED DURING JULY-DECEMBER, 97 SURVEY HERDS IN THE DETROIT MILKSHED, 1947

Seasonal Pattern	Number of First-Calf Heifers Added Per Herd	
	Total	Proportion Added July-December
	Number	Per Cent
Spring-Summer	3.1	62
Summer-Fall	1.7	72
Fall-Winter	2.9	66
Even	4.2	78

The even producers freshen more heifers into the herd each year, and a greater percentage of these are freshened during the latter six months of the year than any of the other production patterns. Since the survey was made, the author has been continuing work in the Detroit milkshed in the capacity of project leader of the Dairy Cost Study. Consequently, he has had an opportunity to talk with many of the successful and unsuccessful dairy men in the milkshed. The author has found quite conclusively that among the more successful dairymen there is a general feeling that to obtain even production, a number of heifers must be freshened into the herd during the late summer and early fall months.

Difficulties in obtaining desired time of freshening.- The time of breeding is the most important factor in determining the milk production timing of the dairy herd. To control the time of breeding in an effort to level the milk production timing, a farmer must be especially watchful for heat periods of cows in his herd during the late pasture season and the early part of the barn feeding period. This requires skill and management ability on the part of the dairyman. There are difficulties and problems involved. An effort was made to determine these difficulties and how the herds in the various production patterns were handled in respect to them.

The principal hypothesis being tested here is that in the herds that are turned out at least once a day, the farmer will have more opportunity to detect the cows that are in heat than in the herds which are not turned out. By being able to have these cows in heat bred during the barn feeding period, they will freshen during the months when milk production is ordinarily low and, thereby, increase production at this time.

The herds surveyed were tabulated on the basis of the number of times during the day that they were turned out (Table XIII). There is not much difference in the percentage of the herds in each pattern that turn out at least once a day, but when the herds that are never turned out are considered, there is a great deal of difference. The difference is mainly between two groups of patterns, the spring-summer as compared to the fall-winter and the even groups. In the former, the percentage of the farmers that never turn out was much greater than the latter two groups.

In the survey schedule the question was asked of the cooperators if they had trouble detecting cows in heat during the barn feeding period. Thirteen per cent of the spring-summer compared to thirty per cent of the even producers did have trouble. This would indicate one of two possibilities; they are: (1) The even producers were more aware and gave more thought to the time of breeding; and/or (2) they had more cows coming in

TABLE XIII. PERCENTAGE OF HERDS TURNED OUT FOR EXERCISE DURING THE BARN FEEDING PERIOD, 97 SURVEY HERDS IN THE DETROIT MILKSHED, 1947

Item	Proportion in Pattern			
	Spring-Summer	Summer-Fall	Fall-Winter	Even
	Per Cent	Per Cent	Per Cent	Per Cent
Cows Out Every Day	69	57	73	70
Cows Out Occasionally	4	29	20	20
Cows Never Out	27	14	7	10

heat during the barn feeding period.

To determine if this trouble in detecting cows in heat was the result of not turning cows out for exercise and thereby not having nearly as good a chance to determine if a cow were in heat, Table XIV is presented.

TABLE XIV. FARMERS HAVING TROUBLE DETECTING COWS IN HEAT WHERE COWS WERE OR WERE NOT TURNED OUT DAILY DURING THE BARN FEEDING SEASON, 97 SURVEY HERDS, DETROIT MILKSHED, 1947

Item	Proportion Having Trouble Detecting Cows in Heat			
	Spring-Summer	Summer-Fall	Fall-Winter	Even
	Per Cent	Per Cent	Per Cent	Per Cent
Herds Out Daily	6	13	9	21
Herds Not Out	33	17	50	50

Some farmers were having trouble detecting cows in heat and others were not. This table concerns those that said they were having trouble. They are divided according to whether they turned their cows out daily or not. It is very evident that those herds which were not turned out had a great deal more trouble detecting cows in heat than those herds which were turned out. This describes a fundamental management practice in the successful managing of the breeding time of the cows in the herd in an effort to maintain a desired production pattern. If a farmer is going to compensate for the natural causes of high spring and summer production, he has to control the breeding program. To control the breeding program he must know, or be able to tell, when his cows are in heat. During the barn feeding period it is the general opinion that it is difficult to determine if cows are in heat because of the cows being stanchioned, or otherwise fastened. This fact makes it desirable for a farmer to let his cows out daily, not only for the value of the outdoor exercise, but because it makes detection of heat periods much easier.

Another factor that is very helpful in the successful observation of heat periods is for the farmer to keep good breeding and calving records. This is important because of the stable time element in the esterus cycle (ovation cycle) in the cow. By keeping a record of previous calving date and previous

heat periods, the time of the following heat period can be approximately predicted. In this way breeding records aid the dairyman in observing heat periods, especially during the barn feeding season. The results given in Table XV show the percentage of farmers in the various production patterns who kept breeding records of their herds.

TABLE XV. PROPORTION OF FARMERS KEEPING BREEDING RECORDS, 97 SURVEY FARMS IN THE DETROIT MILKSHED, 1947

Item	Proportion in Pattern			
	Spring-Summer	Summer-Fall	Fall-Winter	Even
	Per Cent	Per Cent	Per Cent	Per Cent
Keeping Breeding Records	80	71	73	100

Table XV indicates two important points. One is that most of the farmers in the Detroit milkshed keep some kind of a breeding record. The second is that the producers maintaining an even production pattern all kept breeding records compared to the eighty per cent of the spring-summer group that did. This again points to a higher degree of management, or at least a greater interest in the dairy enterprise on the part of the even producers.

To further look into the difficulty of obtaining the

desired time of freshening, the following question was asked of the farmers surveyed: "Do you have trouble in getting cows to freshen in certain seasons?" The question was phrased and was asked at such a time during the interview so that it implied to the farmer, "do you have any trouble getting cows to freshen for base period?" The results of Table XVI would indicate that the spring-summer and the summer-fall producers were not concerned about time of breeding, and the even producers and the fall-winter producers were experiencing more difficulty in obtaining the desired time of breeding due to being in the barn when the greatest percentage were to be bred.

TABLE XVI. PROPORTION HAVING TROUBLE IN GETTING COWS TO FRESHEN IN CERTAIN SEASONS, 97 SURVEY FARMS IN DETROIT MILKSHED, 1947

Item	Proportion in Pattern			
	Spring-Summer	Summer-Fall	Fall-Winter	Even
	Per Cent	Per Cent	Per Cent	Per Cent
Having trouble getting cows to freshen in certain seasons	25	21	50	70

Culling and Replacement

The rate of turnover in dairy herds in the Detroit milkshed is about once every four years. Seventy per cent of turnover was accounted for by fresh heifers coming into the herds. Cows

bought accounted for thirty per cent of the turnover.[13]

There is a general feeling that one method of reducing seasonality of production is through buying cows to be put into the herd when production is low. This would in almost all cases mean buying cows in the late summer and during the fall in an effort to bring up the characteristically low fall milk production. In an effort to learn the degree to which the buying of cows was practiced and what period during the year they were purchased, the number of cows bought was tabulated by feeding periods from herd records of the even and the spring-summer producers (Table XVII).

TABLE XVII. PROPORTION OF TOTAL COWS BOUGHT IN 1947 BY FEEDING PERIODS, 56 HERDS IN DETROIT MILKSHED

Production Pattern	No. of Herds	Winter Feeding Period	Early Pasture Season	Late Pasture Season
	Number	Per Cent	Per Cent	Per Cent
Even	33	45	11	44
Spring-Summer	23	58	19	23

Source: Dairy Cost Study, monthly records of 56 herds, Detroit milkshed, 1947

About forty-five per cent of cows bought by the even producers were purchased during the late pasture season. This includes the months of August, September and October. Purchases

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[13] T. L. Hodge, "Dairy Costs and Returns in the Detroit Milkshed," Mich. Agr. Exp. Sta. Mimeo., Ag. Econ. 454, (July, 1949).

were heaviest during the month of October. In contrast to this, the spring-summer producers purchased only twenty-three per cent of the cows bought during the year in the late pasture season. The spring-summer producers purchased relatively more of their cows in the other periods of the year than the even producers.

This section on the time of purchasing of cows for replacement lacks significance due to the low number of cows purchased. Even though there was a total of 56 herds in this analysis, the number of cows bought for replacement only averaged a little over one cow per herd.

The replacement of cows through purchasing them has not been an effective method of controlling production timing. The arguments presented above - only small differences in purchases by the two production patterns and only a small proportion of replacements due to purchased cattle - are the most important reasons why this is true. Further, the leveling of production timing in the aggregate by the purchasing of cows for production during the low periods is not very effective because most of the purchases are made locally. By purchasing locally at farm sales and individually buying cows, farmers only shift their own production timing pattern. If the cows bought were purchased from outside the milkshed during the period of low milk production, the effect would be to increase production during that period.

The time of culling cows from the herd did not appear to

be significant in its effect on the production timing. The results in Table XVIII indicate only that the spring-summer producers sold relatively fewer of their cows during the spring and summer months than did the even producers. This would be true mainly because the spring-summer producers would have relatively more of their cows milking during the pasture period.

TABLE XVIII. PERCENTAGE OF TOTAL COWS SOLD BY QUARTERS, DETROIT MILKSHED, 1947

Production Pattern	No. of Herds	Proportion of Cows Sold Each Production Pattern in:			
		Winter	Spring	Summer	Fall
	Number	Per Cent	Per Cent	Per Cent	Per Cent
Even	33	23	22	22	33
Spring-Summer	23	36	19	16	29

Source: Dairy Cost Study, monthly records of 56 herds, Detroit milkshed, 1947

Feeding Practices

It is the opinion of some research workers that a substantial portion of seasonality of milk production could be eliminated by adjusting the feeding program. About forty-four per cent of the even and the fall-winter producers who were surveyed in this study said that feeding variation was the main factor giving them trouble in maintaining fall production. This is evidence

to the proposition that the feeding program on the dairy farm is important in its effect on the milk production timing of the dairy herd.

Measures of the value of various feeding programs are difficult. Feeds vary in value not only by kinds, but by nutrient and vitamin content. For instance, two farmers may have reported that they were feeding alfalfa hay to their cows during the winter, while in reality they may have been feeding alfalfa hay that differed widely in nutrient and vitamin content. The same thing could be said about all other feeds--pasture is especially variable. Because of the difficulty of determining a value for the feeds fed by the various groups of producers, this section on feeding practices is limited to quantitative measures of feeds.

In Chapter III there was an analysis of the effect of pasture on the milk production timing of a dairy herd. Evidence presented there showed that production increases when cows are turned out on pasture in the early pasture season. The early pasture season is characterized by moderate temperatures, lush young pasture growth, and comparative freedom from insects. As the pasture season advances into July and August, there is a decrease in the rainfall and an increase in temperature and insects, with the resultant effect of reduced milk production.

The problem of the farmer is to maintain, insofar as is

profitable, the high production of the early pasture season during the late pasture season by supplementing the available pasture with other feeds. The pasture program of the spring-summer and the even producers shows some differences in intensity and pasture supplementation which may be important (Table XIX).

TABLE XIX. COMPARISON OF PASTURE PROGRAMS ON EVEN AND SPRING-SUMMER DAIRIES, 63 SURVEY FARMS IN THE DETROIT MILKSHED, 1947

Item	Even	Spring-Summer
No. of Farms	19	44
Tillable Pasture		
Acres per Cow	1.87	2.01
Days on Pasture	150	156
Percentage Supplementing Pasture with:		
Grain . . . . . (%)	85	83
Hay . . . . . (%)	54	44
Silage . . . . . (%)	38	31

The even producers show a more intensive pasture program than the spring-summer dairies. The intensity of pasture usage is evidenced by the acres per cow. However, this is not conclusive. If techniques for measuring pasture value were better developed, then some weight could be given to an objective meas-

uring of the differences in pasture programs by the producers in the various production timing patterns. It is safe to say that increases in the amounts of total digestible nutrients, whether from pasture or other supplementary feedstuffs, will result in increases in milk production when holding other factors influencing milk production constant. This phenomenon has been tested by the U. S. Department of Agriculture within limits of diminishing returns in a study called Input-Output Relationships in Milk Production.[14] The results revealed that increases in the amounts of total digestible nutrients supplied will result in an increase in production over normal milk production curve. The marginal increase in production shows a typical diminishing marginal product curve (Fig. 12).

To obtain even milk production timing, holding date of freshening and other factors affecting seasonal milk production constant, additional amounts of total digestible nutrients must be fed to the level of the amount of the total digestible nutrients supplied during the early pasture season. This would result in even milk production except as milk production would be increased by the "x-factor" found in early pasture grasses.

The farmers surveyed made numerous comments in regard to the feeding program to maintain even production. One farmer who has a very high producing herd said that his herd dropped in production when he turned his cows on pasture. He felt that the

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[14]E. Jensen, J. W. Klein and Others, "Input-Output Relationships in Milk Production," Technical Bulletin No. 815, U. S. Dept. of Agr., Washington, D. C., (May, 1942), p. 40.

reason for this was that he fed at a very high rate in his barn feeding programs. When the cows were turned on pasture their feces became very loose and they went partially off feed, and as a result their production dropped. The great majority of farmers accepted the fact that their cows increased in milk production when the cows were turned on pasture.

Farmers attempting to obtain level production usually have to supplement their pasture during the late summer and fall months by an increase in total digestible nutrients intake through the use of grains, hay and/or silage. Pasture, especially wild pastures of June grass, decline severely in value during the hot, dry months of July and August. This affects milk production adversely. There is also the effect of the heat, not only on the pasture with its resultant effect on production, but also the direct effect of the heat on a cow in reducing production. These reasons, together with the fact that insects are more numerous at this time, have an adverse effect on milk production.

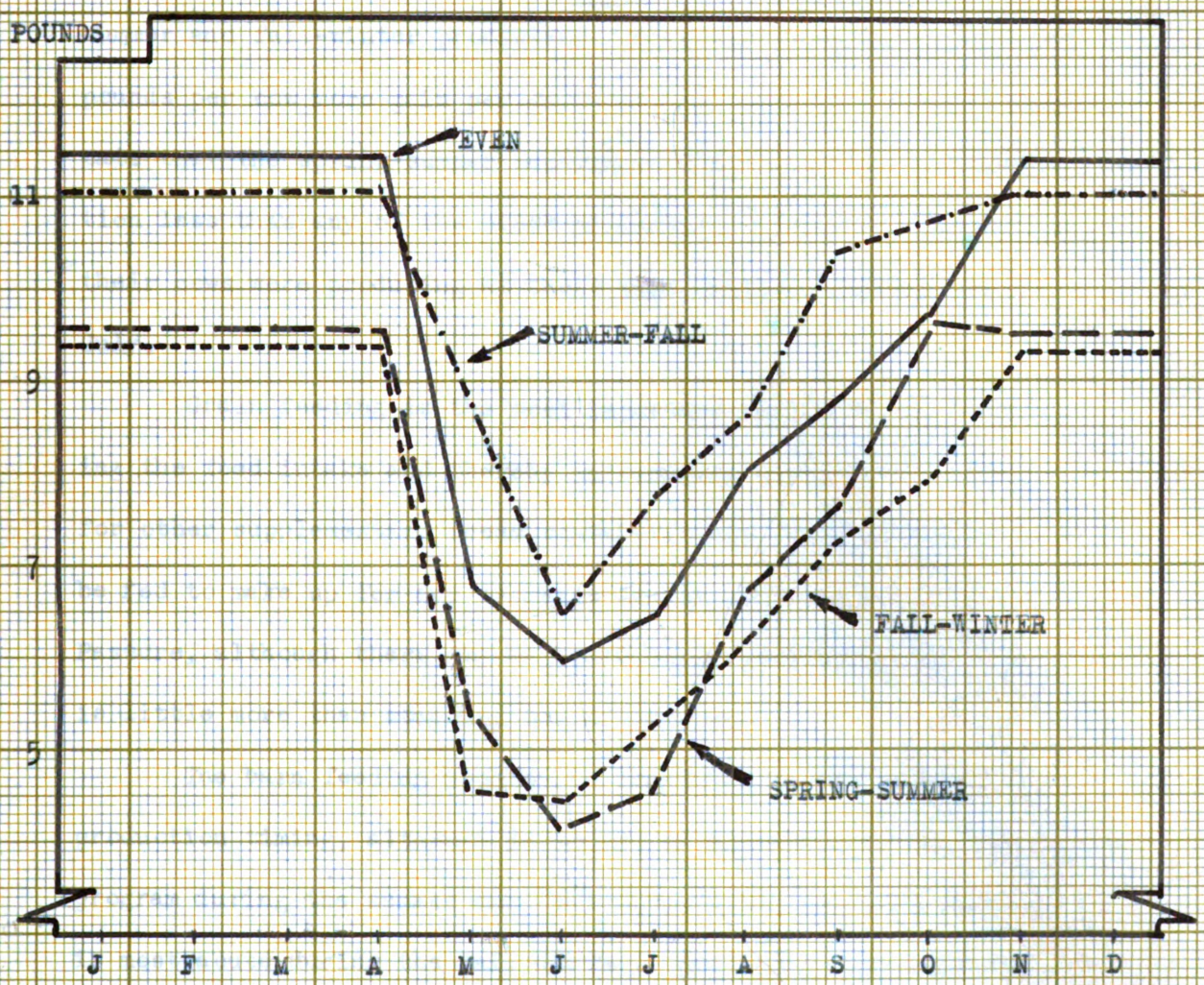
A great many farmers have overcome the effect of the season on pasture by using pastures which will produce suitably when the native pastures dry up. The legumes, Sudan grass and Reed Canary grass are plants which yield well during the months of July and August. Alfalfa, usually grown with Bromegrass, makes up a large proportion of the dairy pasture in the Detroit milkshed. Sudan grass is often used as emergency pasture because

of its characteristics of growing to a highly palatable luxuriant crop in a few weeks after planting quite late in the spring. Reed Canary grass is adapted to low swampy conditions, has excellent growth characteristics, and maintains growth through the late summer months. For these reasons it, too, is becoming highly regarded as dairy pasture for the late summer period.

Fifty-three per cent of the even producers compared to sixty-two per cent of the spring-summer producers said they had all the pasture they needed. The spring-summer producers were producing relatively more of their milk during the summer, partially because they do have more pasture to use. The reason for the even producers indicating that they had more of a pasture shortage than the spring-summer producers could be that they were more aware of the effect pasture plays in their herds' milk production in the late summer and early fall.

Most of the dairymen surveyed did practice supplementary feeding during the months of pasture shortages. There was very little difference among the seasonal production groups as to the number feeding some kind of supplemental feed. The differences themselves would mean little at any rate because of the vast differences in the pastures being supplemented and in the amounts, kinds and quality of the supplementary feeds. The rate of grain feeding, though, did indicate some significant differences among the various production patterns (Fig. 13).

FIGURE 13. RATES OF GRAIN FEEDING PER COW PER DAY BY PRODUCERS IN DIFFERENT PRODUCTION PATTERNS, 97 SURVEY FARMS, 1947.



Data for Fig. 13 were obtained from the survey cooperators by obtaining from them the average amount of grain fed per cow for the barn feeding season and the average amount fed per cow for each month during the pasture season. Results of the tabulation show that the even and the summer-fall producers feed more grain on the average all through the year than do the spring-summer and fall-winter producers. The former averaged about two pounds per cow more gain per day than the latter. It would indicate that the spring-summer producers feed according to production less than any of the other production patterns because their cows were producing at their peak during May, June and July.

Grain feeding is the most important method of regulating the feed intake and thereby influencing milk flow. Grain for other supplementary feeds containing the "grain factor" must be fed to make up for any decrease in the value of pasture. Pasture, although there may be quite large quantities per cow, is little more than standing hay after June.

The barn feeding program is important in its effect on production timing, although it is not as important as the feeding program during the summer and fall because the seasonal shortage is most acute during the fall months. The amount of feeds fed during the barn feeding season affects the condition and health of the cow, which in turn affects the milk production in the

months following. A cow in good condition after barn feeding would be inclined to produce more milk when turned on pasture than one in poor condition. However, the effects of good body condition at the end of the barn feeding season on milk production of cows would be slight at the end of the pasture season if they were allowed to become thin while on the pasture. But if they were kept in good condition through the pasture season, there would presumably be a greater milk flow during the months of normally low production than if she had been allowed to become thin during the summer.

There is a definite lag in milk production response to increased amounts of total digestible nutrients by cows in poor condition. A number of the farmers surveyed felt that production drops in many herds during the summer because farmers think that their herds are getting enough feed from the pasture through the summer. Because of being extremely busy and through failure to notice the decrease in the value of their pasture, the production in these herds begins to drop. By this time much body flesh has been drained through the milk pail and production will be at a lower level.

Feeding grain according to production means that a certain number of pounds of grain is fed to a cow producing a certain amount of milk with consideration for differences in butterfat content of the milk produced. Many rule of thumb formulas are

used to arrive at the amount of grain to feed. Probably the most popular rule of thumb is to feed one pound of grain to every four pounds of milk. Generally it is thought that feeding cows according to individual cow production is better dairy herd management than feeding the cows all at the same number of pounds. The cooperators were asked if they fed grain according to production to give a further indication of their management ability and to determine if more of the producers in the desirable production patterns fed to production than did the other producers.

TABLE XX. PERCENTAGE FEEDING GRAIN ACCORDING TO PRODUCTION BY PRODUCTION TIMING PATTERNS, 97 SURVEY HERDS, 1947

Item	Proportion of Producers in Each Pattern Feeding Grain According to Production or Some Other Method			
	Spring-Summer	Summer-Fall	Fall-Winter	Even
	Per Cent	Per Cent	Per Cent	Per Cent
Feeding According to Production	56	66	40	80
Other Methods	44	34	60	20

Table XX indicates that the even producers had a higher percentage feeding their cows according to production than by any of the other production patterns. The conclusion is that this would indicate the even producers are probably better managers

and that by feeding according to production, other factors being equal, the chances for maintaining even production timing are greater.

The cooperators were asked if they fed grain to dry cows (Table XXI). The purpose was to indicate another measure of the ability of management and to determine if there were differences among production timing groups. Feeding grain to dry cows is considered a desirable herd management practice because it increases the amount of flesh on the dairy cow and thereby results in greater milk production during the lactation.

TABLE XXI. PERCENTAGE FEEDING GRAIN TO DRY COWS BY PRODUCTION TIMING PATTERNS, 97 SURVEY HERDS, 1947

Item	Proportion in Pattern Answering Yes			
	Spring-Summer	Summer-Fall	Fall-Winter	Even
Do You Feed Grain to Dry Cows?	71	64	80	80

The even and the fall-winter production indicated that they were more disposed to feeding grain to dry cows than were the other two patterns. It would indicate a greater interest and management ability if the assumption that the increased milk production that resulted was more profitable were true.

Diseases and Injuries

Management practices extend beyond feeding and breeding. The amount of disease and injuries is partially a function of the ability of management. Many farmers commented on their production timing as being off because of diseases and injuries.

Bang's disease was mentioned by a few farmers as being the cause for their milk production timing having shifted to a less desirable pattern. Bang's disease shifts production timing often by causing abortion previous to normal freshening. The disease may also affect the breeding efficiency of cattle, evidenced by irregular heat periods, or may go so far as to cause sterility. Other diseases of the reproductive organs were mentioned as a cause for shifts in production timing, too. Cystic ovaries, hard or non-breeding cows, sterility in bulls--all tend to cause trouble in a dairy herd breeding program.

The smaller herds tend to notice the results of diseases, deaths and injuries that remove or shift a cow's production timing more than do the larger herds. This is true because one cow produces a greater percentage of the total milk in a small herd than in a larger one. Some of the small herd owners attributed their particular production timing pattern to the results of diseases and injuries.

CHAPTER VI

MISCELLANEOUS FACTORS

Distance from Market

Distance from market is associated with seasonal production patterns (Table XXII). There is a tendency for the producers who are closer to market to produce more evenly. Fifty per cent of the even producers were located within fifty miles of Detroit, compared to thirty-one per cent of the spring-summer producers. At the other extreme, only about nineteen per cent of the even producers were located beyond the seventy-five mile zone, compared to twenty-five per cent of the spring-summer producers.

There are a number of reasons why the farmers located closer to market tend to produce more evenly than those farther out. First, they have undoubtedly been shipping milk to the fluid market in Detroit longer. This would mean that they have had more time to adjust or correct their production to an even timing pattern. Then, too, because of being associated with more neighbors shipping to the market, they should have more education in the reasons for a seasonal milk incentive plan.

Second, farmers located closer to market are in an area of higher land prices and would, therefore, be inclined to produce more intensively than farmers on lower priced land.

TABLE XXII. RELATION OF DISTANCE FROM MARKET TO SEASONAL PATTERNS, 346 SAMPLE PRODUCTION RECORDS, 1947

	Proportion of Producers in Each Seasonal Pattern by Miles from Market		
	Less than 49.9	50-74.9	75-Over
	Per Cent	Per Cent	Per Cent
Spring-Summer	31.0	44.0	25.0
Summer-Fall	42.6	42.6	14.8
Fall-Winter	36.8	36.9	26.3
Even	50.0	31.3	18.7
All Farms	37.6	39.9	22.5

Number of Years Shipping Fluid Milk

There was some association between the length of time milk was shipped and seasonality of production. Shippers in the market less than three years tended to be more seasonal than those in the market longer than that. Those shipping less than three years tended to concentrate in the spring-summer type of pattern. Analysis of percentages in various patterns by length of time milk had been shipped to Detroit showed practically no difference between the various patterns. Adjustment of production timing after commencing to ship milk to Detroit under the base-excess plan, if an adjustment is made, usually takes place in the first few years.

Characteristics of the Operator

Probably the most important factor in whether a herd is an even producer or produces in a pattern characteristic of some other seasonal group is the ability and other characteristics of the operator as a dairy farm manager. The importance of the ability of the operator in determining the milk production pattern on any farm has been implied or specifically mentioned in the previous sections of this report. More specifically it has been shown that there is a positive association between the ability of the operator and an even milk production pattern. This section of the study deals more closely with characteristics other than the ability of a farmer as a manager; namely, age and attitude.

Age of the operator.- There is a definite indication that younger farmers have a tendency to produce in the spring-summer production pattern (Table XXIII). A logical reason for this is that they do not yet have the experience that is associated with ability of management that they will gain as they become older. Other reasons might be that they have not as yet reached their optimum in size of business and capital resources. At the time of the survey, the enumerator contacted some of the older (70-75 years old) farmers within the sample, and upon questioning them as to the reasons why their milk production pattern was of a particular nature, their replies were in essence that their

TABLE XXIII. PROPORTION OF OPERATORS BY AGE GROUPS IN TWO TYPES OF SEASONAL PATTERNS, 97 SURVEY FARMS, 1947

Age of Operator	No. of Farms	Proportion of Shippers in Each Age Classification Shipping in:	
		Spring-Summer	All Other Patterns
Years	Number	Per Cent	Per Cent
Under 34.9	17	23.4	12.0
35 - 54.9	47	44.7	52.0
55-Over	33	31.9	36.0

production responses came about through chance because of being unable to bother with any seasonal milk production improvement program. Their reasons were mainly of a physical nature.

Attitude of the operator.- The attitude of the operator is a difficult quality to measure objectively. The degree of the ability of management that has been referred to in this study has been influenced by the farm operators' use of approved and desirable farm practices. His attitude and beliefs were determined through questions concerning seasonal milk production control methods, his feelings towards the base-excess plan, and his interest and knowledge of the problem.

The proportion of farmers in each pattern keeping a farm record book gives an indication of the interest and attitude of farmers. About ninety per cent of the even producers compared to

about fifty per cent of the producers in the other production timing patterns kept farm account records.

The belief of any particular producer as to why his herds' production response fell into the various patterns is important in evaluating a seasonal pricing plan. If a producer felt that his production response was undesirable but because of some problem that he did not know how to overcome, then action could be undertaken to help him. If the producer had an undesirable production-response but did not particularly care what his production pattern was, then other means would be used to alleviate his problem. In the first instance above, the producer had an undesirable production pattern because of some problem that he did not know how to overcome; if by chance this were a breeding problem or a similar production problem, the action would probably be through an educational medium to show or teach him the methods of controlling such a problem. Or if, as in the second instance, the undesirable pattern was the result of disinterest, the action might take the form of an increase in monetary incentive.

The tabulation of answers to the question asked the spring-summer and summer-fall producers as to why they had such a production timing pattern was designed to find out if the producers had their particular production timing pattern because of problems; if so, what they were; or merely because of disinterest (Table XXIV).

TABLE XXIV. REASONS FOR SEASONAL PRODUCTION PATTERNS AS GIVEN BY SPRING-SUMMER AND SUMMER-FALL PRODUCERS, 62 SURVEY FARMS, DETROIT MILKSHED, 1947

Seasonal Production Pattern	Proportion in Each Seasonal Pattern Giving the Following Reasons for Their Particular Production Timing		
	Breeding Problems	Take Advantage of Base Plan	Other
	Per Cent	Per Cent	Per Cent
Spring-Summer	51	2	47
Summer-Fall	35	41	24

From the farmers' reaction to the question, it was very evident that they were interested in the seasonal milk problem. Although it should be mentioned that two of the forty-five spring-summer producers interviewed were under the assumption that high spring production was desirable and such a production pattern was the direct result of the base-excess pricing plan.

Breeding problems were very definitely in the minds of the spring-summer and the summer-fall producers as the cause of their seasonal production patterns. The higher temperatures and greater number of insects during the late summer months were not mentioned; nor was the quality and amount of feedstuffs except in the relatively few references to pasture. The multitude of answers that were given, other than the main one of breeding problems, which were grouped under the "other" classification, are

given as follows in the order of their importance: need to use pasture; cost of winter grain; poor pasture in latter months; sold cows and diseases; starting or increasing herd; age and health of the operator; low producers; no plan; and competition for labor in the fall.

It would seem that farmers are not fully informed on the response in milk production that can be obtained from changes in feed nutrients. They tend rather to ascribe their difficulties in obtaining a more desirable production timing pattern to a factor which is more evident to them, namely, breeding difficulties.

In any sense it seems that an educational program to help farmers alleviate their production timing difficulties is the best corrective action if such is desirable for the dairy farmers. The criterion for determining whether the spring-summer producers would gain by shifting their production to an even pattern should include a measure of net income and labor distribution. This evaluation is being taken up in another phase of the seasonality problem.

The even and the fall-winter producers answered the question regarding why their production pattern was such quite differently than the spring-summer producers (Table XXV). The interest in the seasonal problem, though, was just as great.

Evident in the responses of the even producers is that

they had an even production timing pattern to take advantage of the base-excess plan. This was also true to a lesser extent in both the summer-fall and the fall-winter production patterns.

TABLE XXV. REASONS FOR SEASONAL PRODUCTION PATTERNS AS GIVEN BY EVEN AND FALL AND WINTER PRODUCERS, 35 SURVEY FARMS, DETROIT MILKSHED, 1947

Seasonal Production Pattern	Proportion in Each Seasonal Pattern Giving the Following Reasons for Their Particular Production Timing			
	Take Advantage of Base Plan	Breeding or Disease Problems	Better Labor Use	Other
	Per Cent	Per Cent	Per Cent	Per Cent
Even	85	-	15	-
Fall-Winter	40	30	15	15

When asked how they obtained such a production response, the even producers answered, "by a planned breeding program" in about fifty-four per cent of the cases. The fall-winter producers gave the same answer in about sixty-five per cent of the cases. About twenty-five per cent of the answers of the even producers mentioned buying winter feed and/or a balanced feeding program as a method to help solve the seasonal production program on their farms.

The attitude of the operator is important in proposing a shift in production timing. An objective measure of whether producers were contemplating a change in their production timing is

given in Table XXVI.

The table indicates that not all producers were satisfied or were producing at the optimum; as is indicated by about fifty per cent of them planning a production timing change. Again, as in previous tables, it is evident that of those planning to shift production timing, the method to be used for the most part was by changing freshening dates. It should be mentioned that many were planning to shift production by freshening heifers. The farmers that planned to shift production by this method were included in the "other" column.

The farmers surveyed were asked whether they had heard of a need for more even production. A surprising number of them said that they had not heard of a need for more even production (Table XXVII).

Roughly, only one-half of the farmers had heard of the need for more even milk production. They indicated for the most part that the source of this information was farm papers--the producers association house organ being mentioned the greatest number of times.

It seems very significant, though, that of those who had heard of the need for more even production, only thirty-six per cent said it influenced them in making production timing changes. This might indicate that either the reasons for more even production were not being brought out clearly or that appeals other

TABLE XXVI. ATTITUDE OF OPERATOR TOWARD SHIFTING MILK PRODUCTION TIMING, 97 SURVEY FARMS, 1947

Seasonal Production Pattern	No. of Farms	Plan to Change Pattern		Method to Be Used by Those Planning Shift			
		Yes	No	Feeding Changes	Change Freshening	Buy or Sell	Other
	Number	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent
Spring-Summer	47	64	36	3	63	27	33
Summer-Fall	15	53	47	13	50	13	38
Fall-Winter	15	33	67	20	60	20	20
Even	20	15	85	-	-	-	100
All Farms	97	47	53	6	55	21	36

TABLE XXVII. PROPORTION OF FARMERS THAT HAVE HEARD OF A NEED FOR MORE EVEN MILK PRODUCTION AND THE EXTENT THAT THIS HAS INFLUENCED PRODUCTION SHIFTS, 91 SURVEY HERDS, 1947

Seasonal Production Pattern	No. of Farms	Proportion of Producers in Each Seasonal Production Pattern That:			
		Have Heard of Need for Even Production		Those Answering Yes: Did This Influence You to Make Production Timing Changes	
		Yes	No	Yes	No
		Per Cent	Per Cent	Per Cent	Per Cent
Spring-Summer	43	51	49	45	55
Summer-Fall	14	57	43	38	62
Fall-Winter	14	43	57	17	83
Even	20	30	70	17	83
All Farms	91	46	54	36	64

than monetary are not effective.

Certainly there seems to be room for improvement in the educational means of transmitting this type of information to more farmers. If the problem of milk production timing is important, then more than forty-six per cent of the farmers should realize that there is a need for a leveling of milk production through the year even though only about one-third of them actively try to effect a change in production timing because of this knowledge.

CHAPTER VII

SUMMARY AND CONCLUSIONS

Milk production responses in the aggregate result in excess supplies in the spring and summer and shortages in the late fall in relation to demand in the Detroit fluid milk market. The base excess pricing plan provides an incentive for even milk production timing to the dairy farmers in the milk shed.

Most farmers in the milk shed have not adjusted their production timing to an even pattern. The object of this study was to determine what differences existed between the farms as to the organizations, practices, and attitude and ability of the operator that have made a shift to even production and those producing highly seasonal. A representative sample of about 97 producers from the Detroit milk shed provided the main source of data.

There are three natural forces causing seasonal milk production that must be overcome if a farmer is to attain an even production response, they are, (1) changes in the amounts, kinds, and quality of feed fed, (2) a natural tendency for spring freshening, and (3) variation in weather conditions.

Overcoming these basic causes of seasonality is likely to result in increased costs. The incentive plan is designed to more than compensate producers who shift to even milk production timing.

There were differences in the farm organization of the dairies

producing seasonally high in the spring-summer compared to the even producing dairies. The spring-summer dairies had a greater percentage of their land in cash crops and roughages, both hay and pasture, than the even producers who had the greater proportion of their land in feed crops. Greater importance of the dairy enterprise relative to the rest of the farm on the even producing farms compared to the spring-summer producing farms was noted. The even producing farms were more intensive as measured by the tillable acres per dairy cow. These differences may cause a question to be raised as to whether the farms with even producing dairies would be more profitable than farms with spring-summer dairies in view of the differences in percent of high value cash crops and presumably lower production costs on the part of the spring-summer producers.

Breeding timing is the major factor affecting milk production timing. Freshenings of cows concentrate in two periods of the year one period includes the months of January, February, and March; and the other is the months of August, September, and October. The even producing herds have the greatest percent of the cows freshening in the latter period.

Farm Operators with average management ability will not obtain increased production from cows by having a greater proportion of his herd freshen in the fall. Greater breeding difficulties

will result in longer average dry periods and consequently not increased production per herd.

Breeding difficulties are increased by having a greater proportion of cows due to be bred in the barn feeding season over the difficulties encountered during the summer pasture season. Breeding troubles were reduced on farms where cows were turned out daily and where records were kept of calving and breeding dates.

The even producing dairies put more stress on the number and percent of first-calf heifers freshening in the fall than the spring-summer dairies. The net cost of delaying the breeding of heifers for fall freshening is not as great as the cost of delaying the breeding of a cow because of the increase gain in weight and size of the heifer.

Buying cows to freshen in the fall was not an important method of controlling the milk production timing in the Detroit milk shed. Purchases of cows for fall production unless they were purchased from outside the milk shed would not affect the aggregate supply of milk in the market in the fall.

Farmers in the spring-summer type of production pattern had more pasture for their cows and they indicated that this was a partial reason for producing most of their milk in the spring and summer.

A greater proportion of the even producing dairies supple-

mented their pastures during the months of normally low pasture production. They fed about two pounds more grain per day per cow than did the spring-summer dairies. Pastures must be supplemented when they begin to decline in value starting the latter part of June. A larger proportion of the even producers fed grain to cows according to production and fed grain to dry cows than the farmers in seasonal patterns.

There were slight differences among producers in various seasonal patterns in regard to distance from market. Factors such as: length of time that the producer had been shipping fluid milk to the market; association with more neighbors shipping to the market; higher land prices, consequently more intensive use of the farm, therefore more knowledge of the pricing plan and the need for level milk production would be the major reasons explaining less seasonality closer to the market.

Farmers think of overcoming the forces which result in high spring-summer milk production by changing the breeding timing of their herd. They did not indicate to any extent the control that can be influenced by feeds. There is a need for more education of the farmers in not only the methods of controlling breeding timing but also that changes in feeds and changes in the amounts and quality of the feeds are factors that will help him control milk production timing. Further, there is a need for more effective ways of educating the farmer that there is a seasonal milk problem. Many farmers would shift production timing to an even supply response if they knew that there was a need for it.

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APPENDIX

Farm No. _____ Interviewer _____

County _____ Date _____

Twp. _____

Section _____

FARM SCHEDULE FOR

STUDY OF SEASONALITY OF MILK PRODUCTION

IN THE DETROIT MILK SHED

Name _____ Address _____

Number of years farming on your own _____; on this farm _____.

Acres owned: total _____; tillable _____. Acres rented: total _____; tillable _____.

Do you keep a farm account book? _____

Member of DHIA, _____ yrs. Association _____

CROPS: ACRES AND PRODUCTION, 1947

Crop	Acres	Yield	Production
Corn for silage		T.	
Corn for grain		Bu.	
Oats		Bu.	
Barley		Bu.	
Wheat		Bu.	
Soybeans		Bu.	
Beans, dry field		Bu.	
Potatoes		Bu.	
Hay - Alfalfa		T.	
Clover		T.	
		T.	
Mixed		T.	
Timothy		T.	
Other crops			
Summer fallow		XXXX	XXXX
TOTAL CROP ACRES		XXXX	XXXX

Other land	Acres
Tillable pasture	
Idle tillable land	
TOTAL TIL. ACRES	
Non-til. pasture	
Woods not pastured	
Farmstds., rds., etc.	
TOTAL ACRES	

Feed Purchases

Kind	Amt. (cwt.)	Price	Value
Soy bean-oil meal			
Linseed oil meal			
Cotton seed meal			
Mixed dairy feed			
Minerals			
TOTAL			

Kind of pasture	Acres	Kind of livestock	No. of head	Date on	Date off	Other feed fed: Kind	Other feed fed: Amt. per day
Tillable:							
Permanent:							

1. Do you have all the pasture you need? _____. If not when is it short _____?
2. What practices (reseeding, manuring, fertilizing) do you use for pasture improvement

_____

_____

SPECIAL MACHINES

Kind	Make	Size	Year acquired	Cost when new
Tractor: 1.				XXX
2.				XXX
Truck				XXX
Combine				XXX
Baler				XXX
Field chopper				XXX
Milking machine				
Water heater				
Milk cooler				

IMPROVEMENTS

1. Barns: Pen or stanchion _____; space for _____ cows, _____ young stock, _____ horses, and _____

   Storage for _____ tons of hay, _____ tons of straw. Condition: good _____; fair _____, poor _____ (check one)
2. Silo: _____ x _____ ft.; Usual settled depth of silage _____ ft.
3. Granary space for _____ bushels of small grain; _____ bu. of corn

Milk house: size _____ when built _____, cost _____

Type of road; paved _____; gravel _____; dirt _____ (check one)

Electricity in main buildings _____ Telephone _____ Running water _____

Distance from milk station, _____ miles. Name of station _____

DAIRY CATTLE

1. Inventory, 1947

Age & Sex	Beginning of Year			End of Year		
	No.	Value per head	Total Value	No.	Value per head	Total Value
Cows, 9+						
Cows, 4-8						
Cows, 3						
Cows, 2						
Heifers 1-2						
Calves						
Bulls						

2. Additions and removals, 1947

Item	Total	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Cows added:													
First-calf heifers													
Cows bought													
Cows removed:													
Sold													
Died													
Cows freshened:													

3. Of cows bought: How many were milking _____, how many to freshen in Feb - Apr _____, May-July _____, Aug - Oct _____, Nov - Jan _____?

4. Number of heifers bought _____; unbred _____; to freshen Feb - Apr _____, May-July _____, Aug - Oct _____, Nov - Jan _____?

5. Cows sold: For dairy purposes _____; because of Bang's _____, mastitis _____; breeding difficulties _____; low production _____; age _____.

6. Heifers sold for dairy purposes _____ Other _____

7. Do you usually raise or buy replacements? _____

FEEDING PRACTICES

How much grain is fed per milking cow per day in winter? _____ In May_____;

June_____; July_____; August_____; Sept_____; Oct_____.

Do you feed grain to cows according to milk production? (Yes or No) _____

If so, complete the following:

High production (_____lbs. milk per day), _____lbs. grain per day

Med. production (_____lbs. milk per day), _____lbs. grain per day

Low production (_____lbs. milk per day), _____lbs. grain per day

3. Was there any period during 1947 when you fed no grain to your milking cows?_____

If so, when and how long? _____

4. Do you feed grain to dry cows? _____. If so, how long?_____Lbs. per day_____

5. When did you start keeping your cows in the barn last fall?_____

Usually_____.

6. Have you changed your feeding practices greatly during the past 5 years?_____

If so, how and why?_____

_____

7. How are cows watered? Bowls in barn_____; tank in barn _____; outside_____

BREEDING PROGRAM

1. How do you decide when to breed?	(Check answer) Heifers	Cows
a. With bull on pasture		
b. Bull turned out at certain times		
c. According to age (usually _____ months)		XXXX
d. As soon as possible after freshening (_____ days)	XXXX	
e. To obtain fall freshening		
f. To obtain freshening in other seasons		
_____		
_____		

2. Do you use artificial breeding? _____ (Yes or No)

Number of cows last year _____.

3. Do you have trouble in getting cows to freshen in certain seasons?_____

a. If so, describe_____

_____

_____

b. Has artificial insemination helped overcome this difficulty?

_____

4. Do you turn cows out in winter? _____

How often? _____

5. Do you have trouble detecting cows in heat during the barn-feeding season? _____

Do you keep breeding records? _____

Describe _____

_____

_____

OTHER LIVESTOCK, 1967

Kind	Number on hand		Increase
	Beginning of Yr.	End of Year	
Horses			
Beef cattle: cows			
Feeders			XXX
Other young stock			XXX
Cows			
Pigs, feeder			XXX
Ewes			
Lambs, feeder			XXX
Rams			

FARM LABOR, 1967

Type	Age	Worked on farm, months	Work off farm		
			Number of months	Season	Type of work
Family: Operator					
Wife					
Regular hired:					

Seasonal hired labor: Operation: _____ No of man days _____

Operation: _____ No of man days _____

Operation: _____ No. of man days _____

Do you use fast milking? _____ (Yes or No) _____

When did you start? _____

How is manure removed? Carrier _____, spreader _____, loader _____, gutter cleaner _____

Milk sold in 1947 to other than the Detroit market, _____ pounds

Purchaser _____

B. Answer "1" or "2"

1. Spring - summer

a. Last year you delivered _____ percent as much milk in _____ as in _____. Why? (Check answer)

(1) Breeding problems . . . . . _____

(2) Need to use pasture . . . . . _____

(3) Cost of winter grain and roughage . . . . . _____

(4) Competition with other enterprises in fall . . . . . _____

_____

_____

_____

2. Fall - winter - even (cross out all but one)

a. Last year you delivered _____ percent as much milk in _____ as in _____ Why?

(1) Take advantage of base plan . . . . . _____

(2) Competition with other enterprises . . . . . _____

(3) Lack of pasture . . . . . _____

(4) Use family labor in winter . . . . . _____

_____

_____

_____

b. How do you accomplish this (Item 2a)?

(1) Buying and selling cows . . . . . _____

(2) Planned breeding program . . . . . _____

(3) Buying winter feed . . . . . _____

_____

_____

_____

c. Have you had any difficulty in maintaining this production pattern? _____. If so, what? _____

_____

C. How many years have you shipped fluid milk to Detroit? _____

D. During the past ten years has your seasonal pattern changed? _____

If so, in what year? _____.

1. What was the nature of the change? From _____ to _____.

2. Why did this change occur?

a. Planned shifts in freshening dates _____

b. Unavoidable shifts in freshening dates _____

c. Purchase of cows _____

d. Sale of cows _____

_____ _____

_____ _____

_____ _____

E. What changes did you make in your farming program as a result?

1. Less cash crops and more feed _____

2. More grain and less pasture _____

3. More pasture and less grain _____

4. Hired more labor _____

5. Hired less labor _____

_____ _____

_____ _____

_____ _____

F. Do you plan to change your present seasonal pattern? _____

If so, why? _____ How? _____

1. Raise more winter feed _____

2. Buy more winter feed _____

3. Change freshening dates _____

4. Buy cows _____

5. Sell cows _____

_____ _____

_____ _____

_____ _____

G. Have you heard anything recently about a need for more even production? _____

From what source? _____

Has this influenced you to make any changes in production? _____

H. What do you think of the present pricing plan (base-surplus)? _____

_____

_____

_____