# A PRELIMINARY STUDY OF SOME FACTORS AFFECTING THE PRODUCTION OF MILK FOR SUPPLY TO AUCKLAND CITY



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# SECTION I

# A PRELIMINARY STUDY OF SOME FACTORS AFFECTING THE PRODUCTION OF MILK FOR SUPPLY TO THE CITY OF AUCKLAND

## INTRODUCTION

The great value of milk as a human food has been well emphasised by the fact that milk production was given, during the war years, first place in the efforts to produce food in Great Britain. Milk is valuable as a source of readily digestible protein of high biological value and because of the high content of protective elements such as Vitamin A and riboflavin. Its importance in the diet is not surpassed by any other single food.

An adequate supply of milk is particularly important in urban areas, since it is here that diets are most likely to be deficient in protective foods and the need for protective elements is likely to be greater.

In comparison with total milk production in New Zealand, the proportion used as whole milk and cream is small. It was estimated by Hamilton (N.Z. D.S.I.R. Bull.89) in 1943-44 as about 4.5%. Nevertheless, in view of the value of milk in the human diet this portion is of great importance, and that importance is increasing.

Since the beginning of the century the quantity of milk consumed as whle milk and cream has more than doubled (Hamilton, ibid.) and probably amounts to some 35,000,000 gallons at least at the present time. The increase has been due to both increasing population and increasing consumption per head (Milk Commission Report, 1944; New Zealand Official Year Book, 1945). It is probable that the population will increase (Calvert: Population Trends in New Zealand, 1946) and with more widespread knowledge of the nutritional value of milk together with increased use in schools, the consumption per head will be greater in the future. Hence it can be expected that the production of milk for market milk purposes will become

increasingly important.

The production of milk for city supply received little attention for many years, and the result was that difficulty was experienced in obtaining adequate supplies of good quality milk for the larger cities. In 1919, the Wellington City Council established a Municipal Milk Department which made contracts with farmers' organizations for a continuous supply throughout the year. This scheme has been very successful.

In the early 1930's the supply of milk for Auckland was in a chaotic condition. Because of this the Auckland Municipal Milk Council was established in 1934, This Council had the task of organising the supply for the city, but its powers were limited.

Later the Government began to supply more interest in the market with trade and introduced a scheme for the supply of milk to schools.

During the war years difficulty was experienced in meeting the increased demand caused by the numbers of armed forces in the country. The position was acute from 1942 onwards, after the outbreak of the war in the Pacific. The Government set up a Commission in 1943 to report on the existing state of affairs in respect of the supply of market milk, and any measures which should be undertaken to improve this.

The Commission in its Report (1944) recommended that the Market Milk Industry should be properly organised and that separate organizations should be set up to deal with the production of milk on farms and its treatment and distribution in the cities. Attention was drawn to certain difficulties involved in town milk production and certain standards of out-put per cow and the amount of labour required for a certain number of cows were considered.

However, little specific information is contained in the Commission's Report. Nor from any other source is much available which bears on the problems experienced by farmers. Hence the purpose of this thesis was to enquire into some of

these problems experienced by farmers, so that they could be more clearly defined with a view to a more thorough investigation being undertaken at a later stage.

FEATURES OF THE MARKET MILK TRADE

The market milk trade requires a relatively constant supply of milk throughout the whole year. This milk must be clean and of or above certain minimum standards of fat and solids-not-fat content so that its food value is guaranteed. Good flavour and attractive appearance are important, and the milk must be free from pathogenic organisms and capable of being kept for a reasonable time.

Because milk is bulky and the time it will keep is limited it is necessary that it be produced where it can be cheaply and quickly transported to the point of consumption. In the past these factors have caused milk to be produced close to cities and towns, although with better means of transport and keeping milk, this is no longer essential. Because of the limited area from which supplies are drawn the farmers in these areas had to guarantee to supply a certain minimum amount of milk throughout the year. In order to ensure that this minimum quantity was maintained farmers have had to aim at a slightly higher level of supply in order to allow for short term fluctuations in supply. The demand for milk varies from day to day, particularly in the weekends. The demand for school milk is only one five days per week, and at present the decreased weekend demand from this cause is not balanced by an increased cream demand over the weekend.

Because of this necessity for over supply at times the cost of town milk must include compensation for the producer for the loss arising from the surplus milk constituting the safety margin of supply

SOME PROBLEMS INVOLVED IN LEVEL MILK PRODUCTION

Compared with seasonal production, the production of a level supply of milk entails many problems.

The position with regard to seasonal supply farms has been fairly thoroughly set forth in the Annual Reports of the Dairy Board, in the Report of the Dairy Industry Commission (1934), and by Fawcett (N. Z. Department of Agriculture Bulletin 138), and Hamilton (N.Z. D.S.I.R. Bulletin 89).

Information specifically applying to town milk supply farms is, as stated earlier, scanty. A little information, largely a matter of estimates and opinions, applying to town milk supply farms in this area is contained in the Report of the Milk Commission (1944) and an article by G. Neville "Town Milk Supply Budgeting" in the Bulletin of the Valuers Institute, September, 1945.

Supply of feed throughout the year is a major problem of the town milk supplier. The seasonal supplied can calve his herd so that best use is made of pasture growth and the requirements of supplementary feeding are at a minimum. The town milk supplier must provide feed not only sufficient in quantity, but also adequate in quality for milking stock at all times of the year. This entials either purchase of large quantities of feedstuffs, making of large quantities of hay and silage, growing of crops, or a combination of these methods. In addition to this extra supplementary feeding provides an additional labour cost.

All the year round milking makes working conditions on town milk supply farms harder than on seasonal dairy farms. The staff of the average seasonal supply farm have little or no milking to do in the winter and less feeding of supplements is necessary. This imposes a greater strain on the labour of the town supply farm unless more holidays are given, in which case labour costs are increased.

The town supplier is subject to stricter regulations with regard to his supply than the seasonal supplier. Although most of his milk is paid for on a gallonage basis, he is penalised for supplying milk below a certain minimum test. This means care in selection of the animals used and in the calving of a mixed herd. Although the seasonal supplier is paid on a butterfat basis, he is not subject to regulations with regard to test. Cleanliness and attention to possible sources of disease organisms on town milk supply farms demands a higher standard of chowshed, and greater care than on seasonal supply farms.

These are some of the problems of town milk producers generally which can be foreseen from the difference between seasonal and level production. Others will be related to specific conditions under which town milk production is carried on in any area.

DEMAND FOR MILK IN AUCKLAND CITY

During 1944 8,966,735 gallons of milk were sold in Auckland, and in 1945, 8,838,741 gallons.

This included 360,808 gallons of milk consumed in schools in 1944, and 384,007 gallons in 1945.

This demand is likely to increase. The Milk Commission (1944) considered that it would be unsafe to plan for an annual increase less than the consumption of 3,000 persons. Demand for milk for use as cream is also likely to increase as restrictions are removed.

The demand is not a steady one throughout the year. The Auckland Milk Council found that the demand increased in the summer period, being highest about November, December, February and March. This adds a complications to the supply problem since this highest demand should be met, not only the average monthly demand.

The demand for milk in school exists only on week days. The above figures indicate a probable supply of about 1,800 gallons per day on schooldays. If this is met on school-days there must be an excess of milk produced over weekends and holidays. Unless this excess can be used to satisfy other demands it creates a problem. Perhaps the removal of restrictions on the use of cream will help to dispose of some or all of the weekend surplus.

THE AUCKLAND MILK BOARD

In the early 1930's a severe price war was waged between companies engaged in retailing milk. Prices were forced down to such an extent that there were fears that the city liquid milk supply might become inadequate and the quality of milk suffer.

The Auckland Milk Council was created by statute in 1933-4, with the object of organising the supply of milk to Auckland so as to ensure adequate supplies of clean, safe milk. The Council established standards for the quality of milk for city supply and had inspectors to carry out tests of suppliers milk. The Council was in control of a licencing system. The producers made indenendent contracts with milk treating houses. The Council licenced producers to supply one treating house, not to supply town milk generally. By limiting the number of suppliers licenced to each treating house the Council ensured an adequate return to proddcers, since there could be no great excess of milk available with consequent surplus difficulties. The Council could exercise control over the quality of the supply by the threat of cancellation of lieences. Prior to September 1st, 1944, the Council had the function of fixing prices to be paid for town milk in different periods of the year.

The Council apart from its price fixing function, and control over the quality of the supply could only authorise producers to supply milk. It could not exercise full control over the organization of the supply which remained in the hands of the treating houses. The Council's control through the cancellation of licences was really limited since the effect of refusing to permit a supplier of a large quantity of winter milk to continue to supply would have meant difficulty in meeting the winter demand.

The Council succeeded in establishing order in the supply of milk, where chaos had existed previously. By issue of temporary licences for supply at certain periods of the year,

it helped to ensure a supply of milk through the year. As explained above, it could not always cancel licences, and it could not always prosecute in all cases of breaches of the law. Under the Milk Act (1944) the Milk Board which was set up under the Act was given much wider powers.

It was given the function of ensuring an adequate supply of milk of a standard of quality not less than that prescribed under the Sale of Foods and Drugs Act 1908. The Board had the authority to buy and sell milk, to treat milk and otherwise carry on business in milk. It may promote improved methods of producing, collection, treating, and distributing milk. In order to ensure an adequate supply it can investigate contract systems in use, and it is the sole authority in the milk district able to grant licences to supply town milk and cancel licences if necessary.(Milk Act, 1944).

CONTRACTS

All the farmers in this survey had level contracts. That is, they had undertaken to supply the same quantity of milk per day through the year. A major consideration in determining the contract a farmer would have for the coming year was the supply he had maintained during the months of June and July of the preceding winter. Deficiency in supply in other periods of the year was not considered to be so serious, since sufficient accommodation milk was available from cheese and butter factories in the surrounding districts.

During the war years contracts were not always reduced because of undersupply. Even if the drought period of 1945/6 was excepted, all the farmers had failed to fulfil their contracts at some period during the three years, yet in only two instances had contracts been lowered, and in one of these the reason was a reduction in herd size, not failure to fulfil the contract.

Good winter production in one year sometimes enabled farmers to undertake to supply greater quantities in the coming year. This occurred in three cases. In one of these cases the farmer (5) refused the increase in contract.

Allowed Surpluses

In order to ensure that short-term fluctuations in production do not endanger the maintenance of their contracts, town milk suppliers must aim at a somewhat higher level of daily out-put than the quantity they have undertaken to supply. In order that this could be done without a financial loss being incurred on the milk produced above the contract quantity, full town milk price was paid for a certain percentage of the contract above the nominated quantity. This has been termed the "allowed surplus".

For the period 1944, 1945 and January to August inclusive of 1946, this allowance was 10% per month of the nominated quantity. From September 1946 until January 1947 inclusive the allowance was 17% of the total nominated quantity for the five months. This meant that a farmer could produce a very large surplus in one or two months of these five, and be paid for it at full town milk prices provided that the total surplus did not exceed 17% of the total nominated quantity for the five months.

Arrangement of Contracts.

Prior to the passing of the Milk Act (1944) contracts were made between the farmers and the treating houses. Under arrangements made subsequent to the passing of the Act, Producer Associations undertook to provide the supply of milk to the treating houses and arranged contracts among their members. If a Producers' Association cannot meet its obligations from its own supply it is responsible for providing satisfactory alternative supplies and must meet the costs involved. The Agreement between the Government and the Industry provides that if

the individual Association's production falls below the nominated quantity a penalty at the rate of a penny per gallon is levied on the Association. If the Association is able to purchase sufficient supplies from registered town milk supplier who are not members of the Association no penalty is levied on the Association. Within the Association if over supply by one membersmakes up for under supply by another the defaulting supplier may not be penalised.(Director,Milk Marketing Division.Private Communication 1947)

ZONES OF SUPPLY

The area from which Auckland City draws its milk is limited only by the willingness of treating houses to collect milk from distant areas, or of the farmers to deliver milk to a collecting point. However the most important town milk area lies close to the city, particularly in the Mangere, East Tamaki, and Pakuranga districts and extending south to the Karaka district near Papakura. During normal times milk from the north comes from almost as far as Helensville.

During periods when the normal sources of supply prove inadequate milk is drawn from outlying cheese factories such as Aka Aka and Drury. In the severe drought period of early 1946 milk was drawn from as far afield as the Hauraki Plains and Matangi.

Physical Conditions Affecting Production in the Surveyed Area

The following section shows soil and climatic conditions in the areas in which the surveyed farms were situated.

Soil Types

The farms surveyed were on soil types 1, 2, 3, 4, and 5.

| | | | |
|---|---|---|---|
| Type 1 | one farm | Type 2 | five farms |
| 3 | three farms | 4 | two farms |
| 5 | two farms | | |

It can be seen that the first four of these types were all close to Auckland City. These comprised the oldest town milk supply areas. All are of easy contour or flat with the exception of small volcanic cones on type 1.

Type 1 was derived from basalt and scoria. This is a fertile type of soil, free draining, but drying out badly in dry weather.

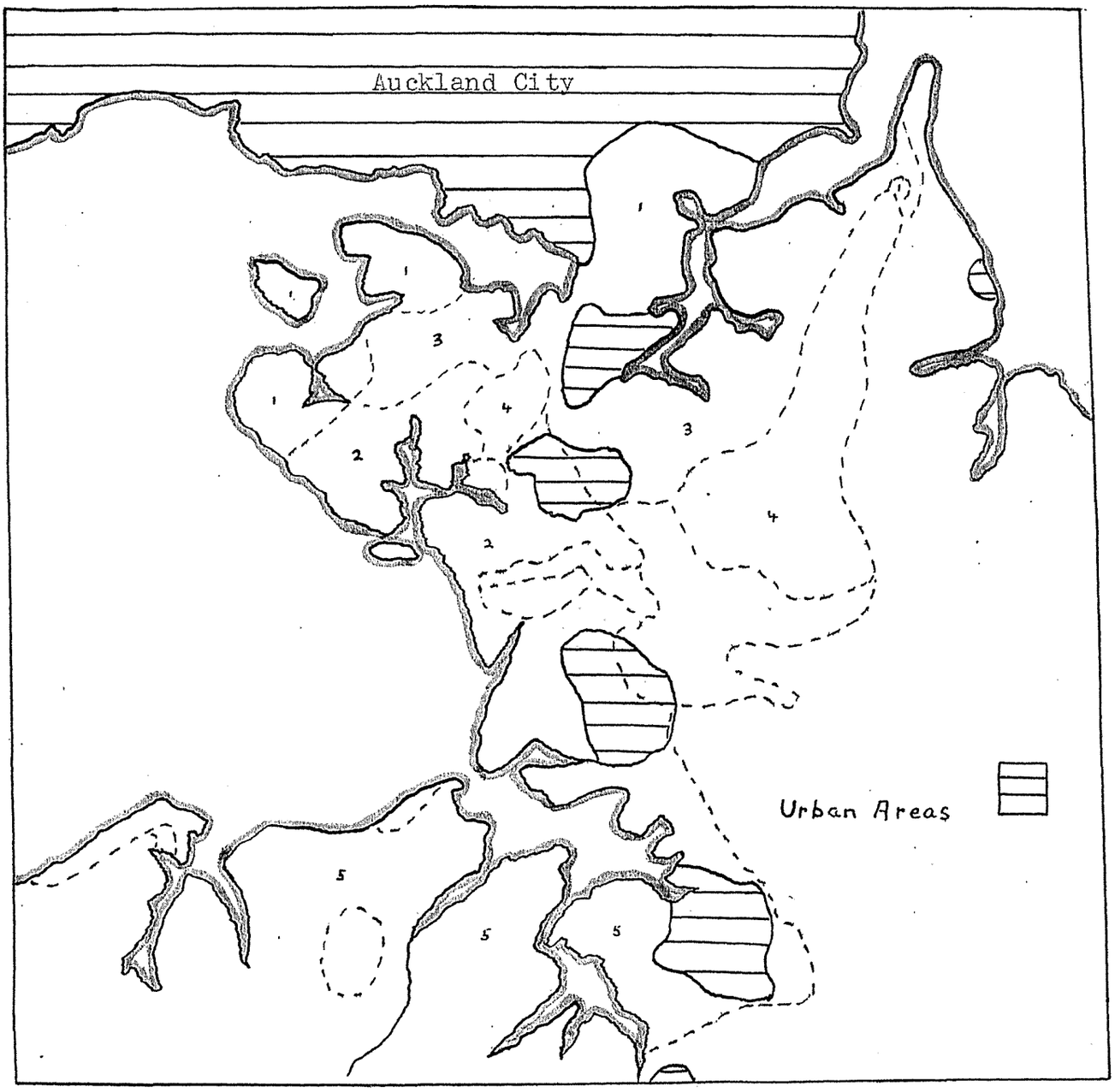
Type 2, derived from Karaka ash, free draining but no as open as type 1, also drying out badly in dry weather.

Type 3, derived from Karaka ash. This soil is similar to type 2 but more mixed and does not dry out quite as readily as the two previous types.

Type 4, derived from a silt loam. A heavier type of soil which does not dry out as badly as previous types but is not quite so suitable for winter milking. One of the farms on

SOIL TYPES IN AREA COVERED

BY THE SURVEY




LEGEND

| | Soil Type | Contour |
|---|---|---|
| No. 1 | Ohaewai loam and Bouldery loam | Flat with small cones |
| 2 | Weymouth clay loam and silt loam | Rolling |
| 3 | Karaka complex, silt loam and heavy silt loam | Rolling |
| 4 | Flatbush silt loam | Undulating |
| 5 | Karaka complex, silt loam and clay loam | Easy to flat |

this type was undulating and the farmer experienced no trouble with pugging. The other was lower lying and flat and more trouble was experienced with winter milking.

Type 5 was in the Karaka district and was a complex type derived from a water sorted ash shower. Not as heavy as type 4, and dries out in dry weather.

This soil was further from Auckland than the others, nearer the fringe of the main town milk supply area. If the demand for milk for Auckland increases this area may become more important in the production of market milk.

Most of the other soils in the area are in smaller patches and towards the west are in hillier country. There is no information available as to the relative importance of each soil type in the production of market milk for Auckland. However it is believed that types 2, 3, and 4 are probably the most important, with 1, because of its smaller area and use for building sites and market gardens, together with the fact that it has small steep cones and is often rocky, less important. Type 5 is probably not as important as the first three types (2, 3, and 4) but may become more so in the future.

Climate

The mild temperatures in this area are illustrated by Table 1 showing monthly mean maximum and mean minimum temperatures for 1944, 1945, 1946.

Table 2, monthly rainfalls for the seventeen years before the period covered by the survey shows that dry spells in the summer months are frequent, although they have not occurred every year.

Graph A shows (a) the monthly rainfall for the period covered by the survey (b) the number of rainy days per month for the same period.

It will be seen that the summer of 1944/5 was wet and conditions were favourable for grass growth. In 1945 a dry period commenced in November and continued through January and February of 1946. Although a number of rainy days occurred

TABLE 1

| | Mean Maximum and Minimum Temperatures(Degrees F.) | | | | | |
|---|---|---|---|---|---|---|
| | 1944 | | 1945 | | 1946 | |
| | Mean Max. | Mean Min. | Mean Max. | Mean Min. | Mean Max. | Mean Min. |
| Jan. | R73.8 | 50.3 | 72.2 | 60.3 | P72.3 | 54.4 |
| Feb. | 74.5 | 69 | 73.2 | 60.3 | 75.5 | 61.5 |
| March | 71 | 59.2 | P70 | 53.2 | 71.8 | 55.8 |
| April | 66.7 | 56.9 | P66.4 | 51.9 | 67.6 | 53.2 |
| May | 61.4 | 49.6 | P59.6 | 45.9 | 63.9 | 54.1 |
| June | 54.9 | 47 | 54.3 | 44.6 | 59.3 | 50.3 |
| July | R57.8 | 38.8 | P55.8 | 41.6 | 59 | 48.7 |
| Aug. | 56.2 | 46.9 | 59.5 | 49.9 | 58.4 | 48.2 |
| Sept. | 58.2 | 48.4 | 60.1 | 49.3 | 61.6 | 49.3 |
| Oct. | 62.3 | 52.3 | P60.7 | 45.6 | 62.7 | 51.2 |
| Nov. | P65.7 | 49.8 | P66.4 | 51.1 | 62.9 | 47.5 |
| Dec. | 67.6 | 55.1 | 67.8 | 54.1 | 66.9 | 55.6 |

NOTE : Where figures for Auckland were not available, those for Riverhead (R) or Paerata (P) have been used.

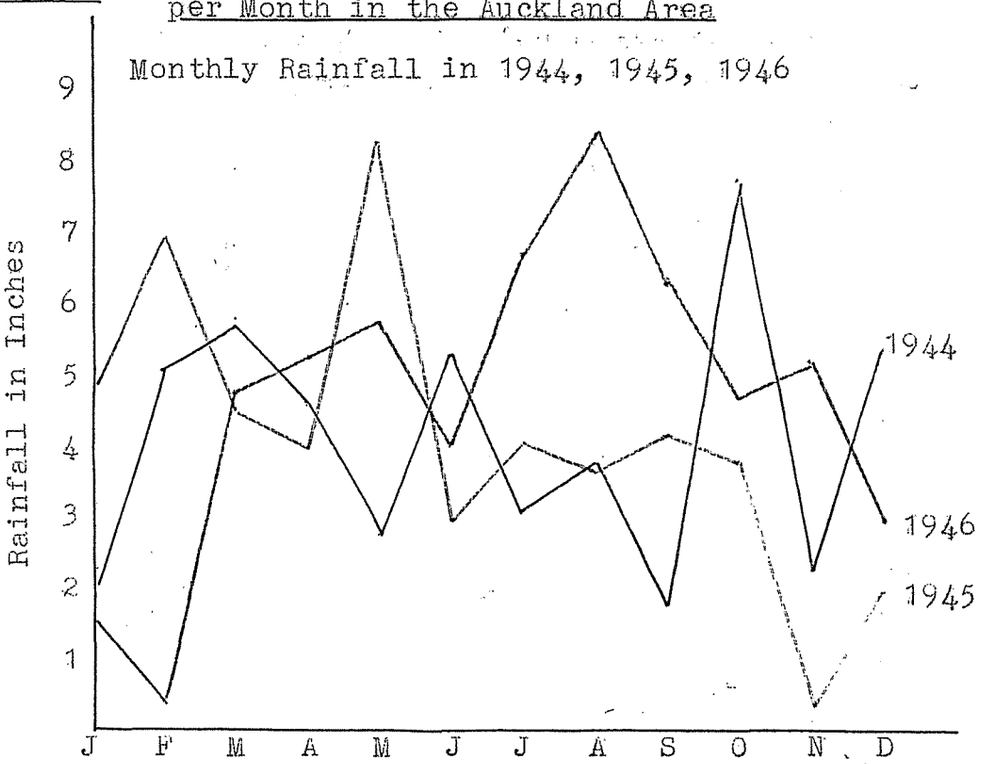
TABLE 2

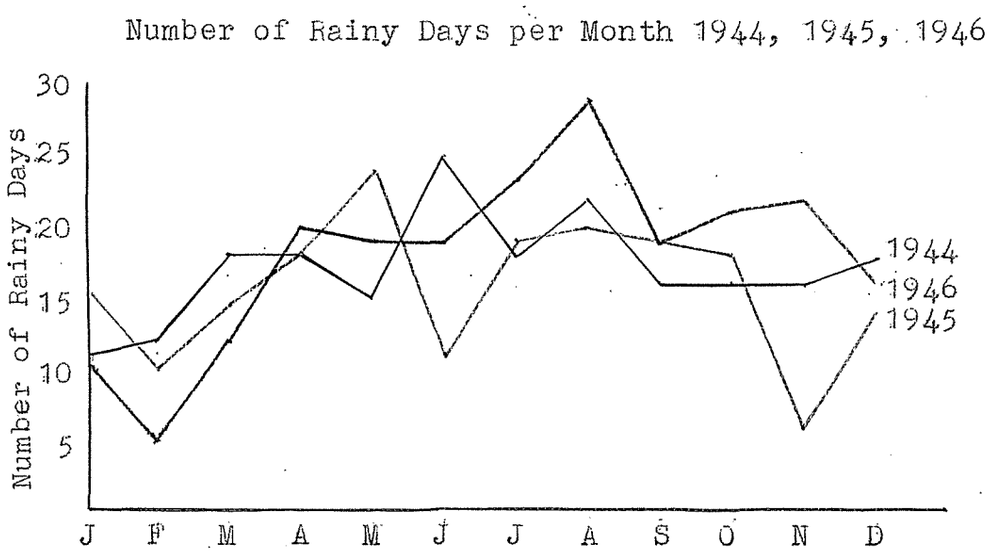
RAINFALL IN THE AUCKLAND DISTRICT
(in inches)
1928 - 1943

| | 1927 | 1928 | 1929 | 1930 | 1931 | 1932 | 1933 | 1934 | 1935 | 1936 | 1937 | 1938 | 1939 | 1940 | 1941 | 1942 | 1943 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan. | 1.46 | 0.20 | 1.38 | 8.4 | 7.38 | 1.14 | 1.48 | 1.57 | 2.24 | 6.89 | 3.98 | 3.75 | 6.02 | 8.16 | 1.65 | 1.32 | 1.57 |
| Feb. | 5.58 | 1.61 | 0.61 | 6.66 | 1.61 | 7.51 | 7.75 | 8.17 | 9.62 | 9.29 | 1.05 | 11.44 | 0.67 | 3.48 | 1,65 | 0.58 | 1.66 |
| March | 4.57 | 3.45 | 5.62 | 0.24 | 0.83 | 3.68 | 0.76 | 1.67 | 4.38 | 2.48 | 3.53 | 0.30 | 0.25 | 1.18 | 4.87 | 2.2 | 0.81 |
| April | 3.93 | 4.90 | 4.62 | 2.85 | 8.99 | 4.05 | 2.39 | 3.33 | 5.07 | 2.72 | 2.71 | 7.38 | 4.03 | 3.08 | 0.91 | 2.19 | 2.48 |
| May | 5.48 | 10.42 | 4.1 | 2.74 | 2.85 | 3.35 | 6.42 | 5.6 | 4.24 | 1.26 | 7.04 | 4.63 | 1.31 | 4.89 | 1.01 | 4.8 | 2.13 |
| June | 7.09 | 5.84 | 5.65 | 4.29 | 5.1 | 4.07 | 2.67 | 6.48 | 7.03 | 2.75 | 7.25 | 5.41 | 7.07 | 2.93 | 6.52 | 0.96 | 9.19 |
| July | 8.47 | 8.54 | 6.22 | 3.49 | 7.1 | 4.64 | 5.03 | 5.97 | 10.55 | 5.23 | 4.23 | 12.00 | 8.44 | 2.6 | 7.77 | 6.74 | 4.21 |
| Aug. | 6.96 | 3.34 | 4.89 | 3.39 | 3.3 | 2.28 | 4.02 | 2.95 | 4.71 | 8.28 | 1.53 | 5.26 | 6.07 | 2.34 | 5.09 | 6.33 | 4.84 |
| Sep. | 4.31 | 7.84 | 2.36 | 4.71 | 4.9 | 2.39 | 4.43 | 2.08 | 2.76 | 3.69 | 4.18 | 2.27 | 4.73 | 2.86 | 3.14 | 4.57 | 7.11 |
| Oct. | 2.66 | 5.24 | 5.35 | 6.11 | 2.15 | 3.33 | 2.91 | 2.17 | 4.12 | 3.15 | 2.07 | 1.66 | 3.08 | 3.35 | 8.49 | 4.42 | 2.5 |
| Nov. | 1.63 | 1.89 | 7.09 | 3.11 | 1.68 | 1.07 | 2.48 | 1.17 | 3.43 | 3.19 | 3.18 | 5.1 | 4.23 | 2.93 | 3.43 | 2.93 | 2.3 |
| Dec. | 1.42 | 6.00 | 3.93 | 0.81 | 3.3 | 2.97 | 2.15 | 2.38 | 3.36 | 3.61 | 2.11 | 4.36 | 3.4 | 5.09 | 2.13 | 2.34 | 1.31 |

each month, this rain was so light that it was of no use as far as pasture growth was concerned. Not only were the falls light but they were in the form of very scattered showers.

Graph A. Rainfall in Inches and Number of Wet Days per Month in the Auckland Area



## METHOD OF COLLECTING DATA

In order that as much information as possible could be obtained a schedule (Appendix I) was prepared. This was not so much a list of questions designed to obtain specific answers, as would be used in collecting data to be treated statistically, but a list of headings under which it was hoped to collect as much information as possible. In most cases this was filled in during conversation with the farmer. In a few cases, where the farmer was too busy to devote sufficient time at one period, the form was completed by him after a preliminary talk and later checked.

With the permission of the farmers additional information was obtained from the Auckland Metropolitan Milk Board. A specimen of data so obtained for one farm is included (Appendix II). Officials of treating houses supplied information on prices, and the Soil Survey Bureau gave details of soils in the area.

### Period When the Survey Carried Out

The survey was carried out between late December 1946 and mid January 1947. The length of time spent was not so much due to time spent on each farm, as to difficulty in arranging to see farmers. In most cases several visits were necessary.

The harvest season was late and wet and haymaking in the district continued well into February. In addition Christmas and New Year holidays intervened and many of the farmers were away. The period between New Year and March when most of the herds start calving for the winter, is generally regarded as the slack period of the year and many farmers take their holidays at this time.

Perhaps surveys in this area would be best made in the early spring months, after the winter feeding out and before harvesting starts in the late spring. The time of making surveys is important, since the quality and quantity of information obtained may suffer is farmers are too busy to spend sufficient time with the interviewer.

Information Obtained

As far as could be judged the majority of the farmers were willing to supply information. There was, of course, no way to check whether or not all available information was given, but it is believed, that in most cases at any rate, deficiencies in data were due to lack of records, not to withholding information.

Most farmers, unless unusually interested in their farming, keep few if any records of their farming operations. Perhaps the drudgery under town milk supply conditions makes these farmers even more chary of paper work. Records dealing with farm finance must be kept, but are often handled by accountants and kept in such a way that they are of little use in investigating past farming operations or costs.

These were no exception; useful and reliable records were few, and because of this, that section of the survey dealing with costs had to be abandoned.

The following is a brief resume of the type of infommation obtained, under several main headings.

Supply

Farmers received returns of milk sent to collecting houses each ten days. These were not usually kept. Some of those available included tests of the supply, but in many cases they referred only to a portion of the supply. In addition the farmers received monthly summaries of milk supplied. Some of these included tests, some did not. In some cases these had been retained, in others the records were not complete.

With the permission of the farmers, records of the milk supplied by farmers, and kept by the Milk Board were obtained. The milk was recorded in gallons, with no record of butterfat. These records did not always coincide with those taken from the monthly return sheets available. The discrepancies however were small, the greatest being about 3% in one month. The reasons given for the differences were that the Milk Board records were based on farmers returns. These returns were required soon after the end of the month, and if

rendered before the monthly statement arrived, errors were likely to be introduced, particularly in conversion of pounds to gallons.

Because the errors involved were small and these records were complete they have been used in this study.

In most cases the data available did not permit the conversion of milk to butterfat. Where this was possible it has been done.

In addition to information on volume of milk supplied, the Milk Board provided the results of tests of the supplies, of butterfat, solids no fat, reductase tests and plate counts.

Stock

Continual variation in herd size and the buying and selling of considerable numbers of stock made any single figure of herd size impossible to obtain. Estimates of the maximum number of cows in the herd at any one time were given.

Farmers had no records of the number of cows in milk each month. The Milk Board had kept records of the average number of cows in milk in each month for a number of herds. These records were based on farmers returns and were obviously "approximate estimates" in some cases. The records were incomplete, and in some cases the returns had never been made. The only alternative to these were farmers' estimates of the number of cows in milk each month.

Records of calving dates of cows, were, in most cases unobtainable. Since it can be expected that a farmer would have a good idea which months most of his cows calved, and in which months few calved, estimates of numbers calving each month can be relied upon to indicate the general calving policies

Information on Feeding

The only measure of the quantity and quality of home produced supplements available was the area used for each crop. Weakness in the accounting systems used prevented much information being obtained of types and quantites of purchased feeds used. Over the war period farmers bought anything that was available, and the only records available in almost all cases

were the sums of money spent on feeds in certain periods.

There was no way of estimating the food given to individual animals, hence the only indication of adequacy of feeding available was the productive level of the herds at different times, due consideration being paid to the calving systems used.

Additional Information

Information on hours of work, was, naturally, of doubtful reliability. The work necessary on a farm varies widely from time to time, and the work done depends on such unreliable factors as the weather. However it was sufficient to indicate the long working day on these farms.

The temperatures of the cooling water used were obtained by the writer, and in several cases differed considerably from what the farmers thought they would be.

In the following sections the reliability of figures used has been indicated.

Because of lack of data in some cases, and the unsatisfactory nature of data in others, the picture presented in the following sections has many obvious deficiencies. This emphasizes the need fof the compilation of reliable records by farmers who are willing to spend the necessary time before more detailed studies are made of specific problems which face town milk suppliers in this district.

Data Relating to Costs

Because of insufficient reliable data that part of the survey concerned with costs was abandoned.

## FARMS IN THE SURVEY

### CHOICE OF FARMS

The farms were not chosen by a method designed to give a random sample of town milk supply farms in the Auckland area. An attempt was made, by enquiry from people in and associated with the industry, to find farmers who were likely to have reliable information and who would be willing to assist with the survey. Because of the preliminary nature of this survey, the examination of a large number of farms was not planned. In any case the time involved in carrying out a detailed study of each farm would have rendered this impossible.

Since the results achieved by a farmer depend not on one or two, but many interrelated factors, it was necessary to consider as many factors as possible in order to avoid obtaining a false picture of conditions on that farm.

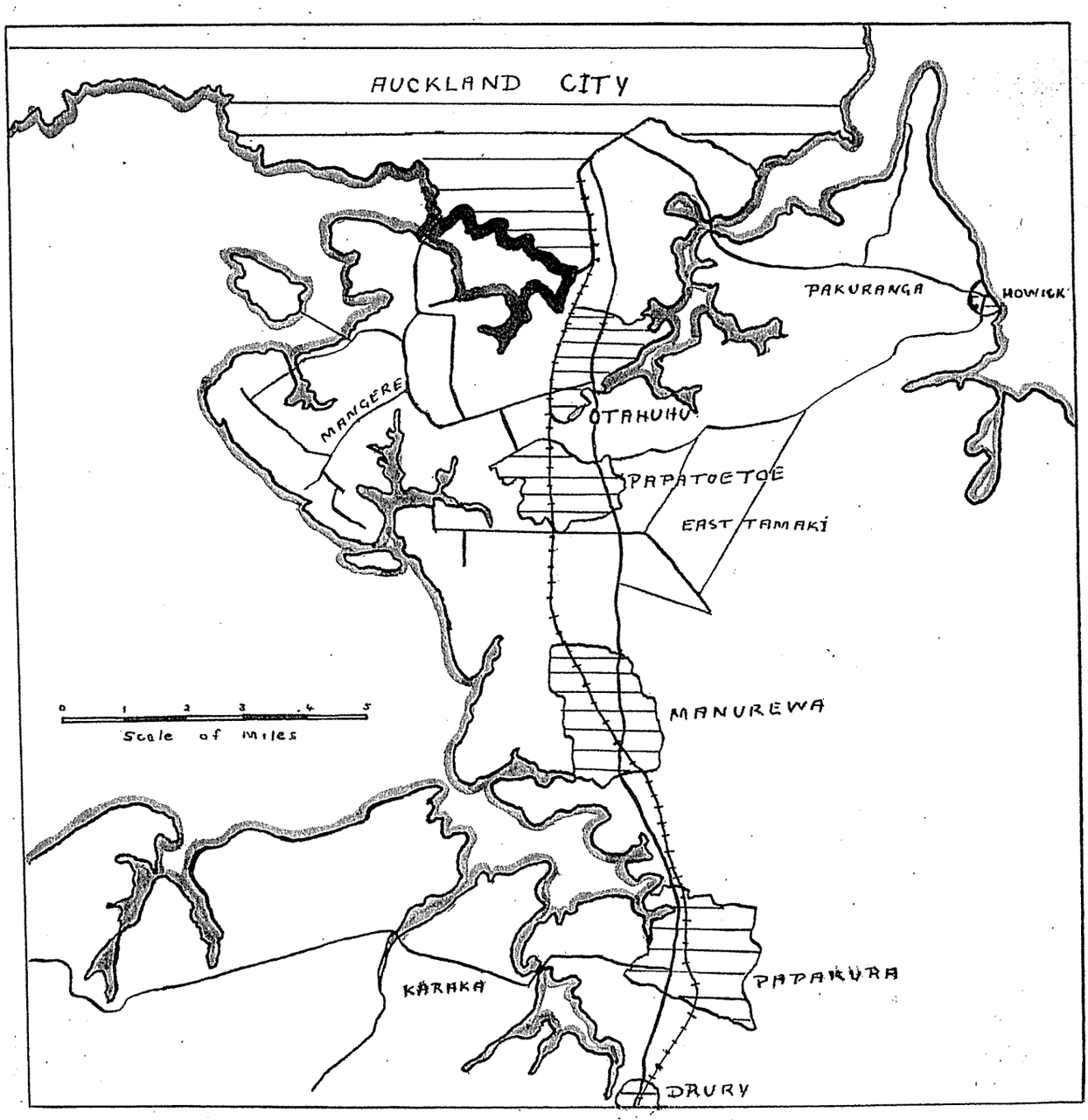
It was not known, when the survey was undertaken, what information would be available or how reliable it would be. The unsatisfactory nature of much of the data soon made it obvious that some portions of the study as originally planned were unlikely to be profitable, and accumulation of more unsatisfactory information was pointless.

From the point of view of indicating the major problems involved in town milk production a small number of farms is likely to be sufficient. The thirteen farms cover a variety of soil types, including the most important for town milk production in the area, and a wide variety of farming policies. It can be reasonably considered that any problems common to the farms of a variable group such as this, are likely to be common to the greater number of farms in this district.

DESCRIPTION OF FARMS

Location

All the farms were in the area to the south of Auckland City. (Map I I).




Five farms - 4, 8, 9, 10, and 11 were in the Mangere district.

Three farms - 5, 6, and 13 were close to Papatoetoe.

Farm 1 was in East Tamaki, Farm 7 in Pakuranga, and Farm 12 close to Otahuhu.

All these farms were within 15 miles of Auckland City.

Two farms - 2 and 3 were in the Karaka district about 25 miles from Auckland.

Areas of Farms

The following table shows the total areas of the farms, the areas of runoffs and distance between runoffs and farms, and the total effective area of the farms.

TABLE 3

| Group | Farm | Area in acres | Runoff in acres | Distance to runoff in miles | Total effective area in acres |
|---|---|---|---|---|---|
| A | 1 | 70 | 9 | ¾ | 79 |
| | 2 | 84 | | | 84 |
| | 3 | 100* | | | 100 |
| | 4 | 107 | | | 107 |
| | 5 | 142½ | 9 | 7 | 151½ |
| B | 6 | 197 | | | 197 |
| | 7 | 200* | 18 | adjacent | 146 |
| | 8 | 50 | | | 50 |
| | 9 | 162½ | | | 162½ |
| C | 10 | 156 | 40 | 3 | 196 |
| | 11 | 85 | 30 | 1 | 115 |
| D | 12 | 26 | 9 (1945/6only) | ½ | 26 1944<br>35 1945/6 |
| | 13 | 66* | 7 | close | 73 |

* Farmer 3 grew 6 acres of peas for canning. The pea haulms from this reas were used as silage. Small quantities of haulms from other farms were also used at times. To allow for this, the effective area as far as the cows were concerned has been taken as 97 acres.

Farmer 7 grew 22 acres of cash crops and ran 200 sheep The sheep were not confined to any particular portion of the farm but if allowed for at a rate of 4 head per acre they would have required 50 acres. To allow for the crops and sheep the effective area for the cows was taken as 146 acres.

Farmer 13 leased about 7 acres in small areas close to his farm for cropping and grazing. The areas used varied from year to year.

The runoffs were the same type and quality of land as the farms. They were used mainly for dry cows and young stock. Farmer 12 used for milkers, Farmers 5 and 7 for hay as well as grazing and Farmer 13 for cropping.

Had these farmers not had runoffs they would have been forced to use areas of their main farms for dry stock. Consequently the effect of the runoffs was much the same as additional areas attached to their own farms would have been. Because of this, in the following sections the areas of the farms have been considered to be the total areas as shown in the last column, which includes runoffs.

Groups : The farms have been divided into four groups according to feed purchase policy.

Group A Five farms where no feed was purchased.

B Four farms where some meal was purchased for winter feeding.

C Meals used all the year round for three years on farm 11. On farm 10 all the year round feeding was carried out in 1944 and 1945 until September. It was resumed in December 1945 and ceased again in April 1946.

D Two farms where brewer's grains were used.

Soils

The soils represented by these farms were those on which most of the dairying in this area is done. Since they have been farmed for many years the original soil types do not give an accurate picture of the present standard of fertility of any farms on them. However they vary in two other factors which have important effects on town milk production. These are the rate of drying out in dry weather and the state of natural drainage.

Farm 8 (Ohaewai loan and bouldery loam) was on a type which is free draining and excellent for winter milking, but dried out badly in the summer.

Farms 4, 5, 9, 10, and 11 (Weymouth clay and silt loam) were on a type which is also very suitable for winter milking in that it is free draining but dries out almost as badly as the previous type in dry weather. This is the main soil type in the Mangere area.

Farms 2, 3, 7, 12 and 13 (Karaka complex type) were on soils which do not dry out quite as badly as the previous types, but are still suitable for winter milking.

Farms 1 and 6 (Flatbush silt loam) were on a heavier type of soil which does not dry out as badly as previous types. It is not quite as good as the previous types for winter milking. Farm was slightly undulating and the water runoff was good, no trouble with pugging being experienced. Farm 6 was flat and did have some land pugged in winter.

In order to give an indication of the vulnerability of farms on some of these soil types to dry weather, production during the first few months of 1946 of the five farms which were self supporting as far as feed was concerned is shown as a percentage of that for the same periods of 1944 and 1945.

TABLE 4

| Farm | Soil Type | Jan.-April prodn. of 1946 as % of that for same period of 1944 | As % of that for same period 1945 |
|---|---|---|---|
| 1 | 4 | 71 | 54 |
| 4 | 2 | 94 | 83 |
| 5 | 2 | 60 | 58 |
| 2 | 5 | 72 | 73 |
| 3 | 5 | 111 | 71 |

The level of production on farm 3 in early 1944 was so low that that of the corresponding period in 1946 was greater despite the drought.

The figures indicate a considerable fall in production during the drought period, particularly in comparison with those for early 1945 when conditions for pasture growth were unusually favourable (Page 14 ).

Drainage

Information available on the artificial drainage on most of the farms was very sketchy. Drains had been laid in the time of previous owners. The present owners knew there were some drains in places but had no idea of their extent.

Farm 6 which was the wettest of the surveyed farms had about three miles of open drains and an unkown amount of tile and other underground drains. Some winter pugging occurred in paddocks and in gateways. Two small paddocks used as a race

way became so badly cut up that they were abandoned as far as grazing was concerned. They were ploughed and disced in summer and left unsown. Since the shed on this farm has been handling a large number of cows all through the year, ease of washing in the shed and cleanliness of milk as well as saving damage to pasture would make some form of surfaced race desirable.

Farm 12 was flat, and with the heavy concentration of stock carried on it pasture tended to suffer in the winter. The owner intended to put in some form of underground drainage.

The extent of artificial drainage on the remainder of the farms was very small, amounting to a few tiles in gully bottoms. A little pugging occurred in gateways and in paddocks where much feeding out had been done in wet winters. This was dealt with by harrowing and rolling.

All the farms except 6 which could be improved were suitable for winter milk production and special feeding sheds for winter feeding were not necessary. They were not, however, so suitable for milk production over the summer and early autumn periods because of the extent of drying out which occurred.

State of Improvement

If sold, all the farms would have been described as "fully improved". With the exception of farm 8, part of which was on a small volcanic cone, they were all ploughable. They were all in grass or crop when surveyed.

This does not mean, however, that they had reached the fullest state of development. Several of the older farms such as farm 10 had a poor layout for a dairy farm. This resulted from the fact that they had not been changed since the early days of their development when they were used for mixed farming. The paddocks were laid out and hedges planted many years ago and remain the same at the present time.

Farm 13 was a leasehold property with the fences and pasture in poorer order than on the other farms.

Some of the cowsheds were of a poor standard for the type of production undertaken. Their renovation or replacement had been delayed by war conditions. This applied particularly

to those on farms 7, 10, 11, 12 and 13. These older sheds were not only unsatisfactory from a cleanliness point of view but also wasteful of time and labour.

Water Supplies : In all cases water supplies were good. The usual sources were bores. On farm 2 water was reticulated by gravity, the remainder used pressure plants. Three used windmills in addition to pressure plants. Trough numbers and size appeared adequate in all cases except farm 6 where the trough size might have been too small for the size of the herd. However there was a constant strong supply from a pressure plant and bore.

Shelter : As far as could be determined all the farms were adequately sheltered. All used live hedges of gorse, barberry and boxthorn, also hedges and shelterbelts of eucalypts, macrocarpa and pines. Farm 5 was the only one lying towards the west. It had seven miles (farmer's estimate) of boxthorn and pine or macrocarpa hedges and shelter belts. None of the farms lay towards the south.

TENURE

Type of Tenure

The farms were all freehold except for 5, 13 and small areas of 10 and 12. Farmer 10 leased 25 acres and farmer 12, 9 acres.

Farmer 5 was a sharemilker on half shares and farmer 13 leased his property.

Length of Tenure

Three of the farmers had been farming their properties less than five years. These were 5, 11 and 13.

Three, 2, 9 and 12 had been farming on their present farms for periods of between five and ten years.

The remainder were older established farmers, particularly 4, 6, and 8. Farmer 6 had been farming on the same farm for over 35 years, and the others had been on their properties almost as long.

CONTRACTS UNDERTAKEN

For purposes of comparison, contracts can be expressed in terms of "gallons per acre per day". This measure is subject to many disadvantages, but no more than production expressed as gallons per acre per year which is commonly used.

TABLE 5

| Group | Farmer | Gallons per day 1943/4 | 1944/5 | 1945/6 | 1946/7 | Gallons per acre per day 1943/4 | 1944/5 | 1945/6 | 1946/7 |
|---|---|---|---|---|---|---|---|---|---|
| A | 1 | 80 | 80 | 80 | 80 | 1 | 1 | 1 | 1 |
| | 2 | 70 | 70 | 70 | 70 | .83 | .83 | .83 | .83 |
| | 3 | 77 | 77 | 77 | 77 | .79 | .79 | .79 | .79 |
| | 4 | 119 | 117 | 117 | 114 | 1.11 | 1.09 | 1.09 | 1.07 |
| | 5 | 140 | 140 | 140 | 140 | .93 | .93 | .93 | .93 |
| B | 6 | 140 | 140 | 140 | 140 | .71 | .71 | .71 | .71 |
| | 7 | 130 | 130 | 100 | 110 | .89 | .89 | .68 | .75 |
| | 8 | 65 | | | | 1.3 | | | |
| | 9 | 156 | | | | .85 | | | |
| C | 10 | 245 | 245 | 245 | 245 | 1.57 | 1.57 | 1.57 | 1.57 |
| | 11 | 95 | 105 | 140 | 182 | .83 | .91 | 1.2 | 1.51 |
| D | 12 | 53 | 53 | 53 | 53 | 1.51 | 1.51 | 1.51 | 1.51 |
| | 13 | 68 | 68 | 92 | 103 | .93 | .93 | 1.26 | 1.41 |

This table shows the contracts undertaken by the farmers in gallons per day and in gallons per acre per day.

Apart from farmer 4 whose contract had been reduced twice, none of the five farmers in Group A (who did not purchase feed) had contracts over one gallon per acre per day. Farmers in Groups C and D, who bought most feed, had contracts markedly higher than those of the farmers in the other two groups. Those of farmers 11 and 13 were raised during the period of the survey.

# SECTION II

## FARMERS' OBJECTIVES

The seasonal dairy farmer, supplying a factory, receives the same return for a pound of butterfat whenever it is produced. Consequently he has one aim in attaining maximum financial returns, that being maximum economical production per acre. To attain this objective he can spread the production of his herd in any way he thinks fit.

The town milk supplier, however, having undertaken a level contract, requires to spread the production of his herd in such a way that this contract is fulfilled, and can aim at maximum returns through maximum economic out-put per acre only in so far as the spread of production of necessary to fulfil his contract will allow him. Consequently he has two factors to consider - the spread of production and out-put per acre.

There is, of course, nothing to prevent a farmer from undertaking a smaller contract which can be fulfilled by spreading a proportion of his supply throughout the year and aiming at maximum production per acre through seasonal production with the remainder.

Because of the two major objectives on town milk supply farms the factors affecting production have been divided in the following sections into those affecting the spread of production, and those affecting production per acre. Since the spread or level of production attained is the result of the effects of many factors, the effects of one factor cannot be shown clearly with the data available. All that can be done is to discuss the factors affecting spread of production and per acre production in relation to these farms and indicate where problems appear to have arisen in connection with these factors.

## SPREAD OF PRODUCTION

The following table shows the percentage of each year's production which would be produced in each price period under a system of level production, together with the percentages of the production of each farm which were produced in each price period.

| | | Price Period | | | | | |
|---|---|---|---|---|---|---|---|
| | | Autumn Feb.-April Yearly Average | | Winter May-Aug. Yearly Average | | Spring Sept.-Jan. Yearly Average | |
| Objective - Level Prodn. | | | 24.38% | | 33.7% | | 41.92% |
| Farm | Year | | | | | | |
| 10 | 1944 | 22.36 | | 36.94 | | 40.7 | |
| | 1945 | 23.24 | 22.31% | 35.58 | 35.99% | 41.17 | 41.7% |
| | 1946 | 21.2 | | 35.6 | | 43.2 | |
| 8 | 1944 | 25.91 | 25.91% | 30.59 | 30.59% | 43.5 | 43.5% |
| 7 | 1944 | 25.29 | | 32.86 | | 41.85 | |
| | 1946 | 20.19 | 23.02% | 32.73 | 32.8% | 47.07 | 44.18% |
| 5 | 1944 | 24.88 | | 31.92 | | 43.20 | |
| | 1945 | 27.81 | 23.48% | 31.09 | 32.16% | 41.1 | 44.36% |
| | 1946 | 16.84 | | 33.67 | | 49.49 | |
| 11 | x1944 | 16/18 | | 31.88 | | 51.95 | |
| | 1945 | 21.2 | 19.91% | 35.4 | 35.35% | 43.49 | 44.71% |
| | 1946 | 21.29 | | 37.61 | | 41.09 | |
| 13 | 1944 | 15.34 | | 33.37 | | 51.43 | |
| | x1945 | 30.6 | 18.91% | 38.94 | 35.98% | 30.46 | 45.11% |
| | x1946 | 12.91 | | 36.33 | | 50.77 | |
| 4 | 1944 | 22.45 | | 33.83 | | 44.0 | |
| | 1945 | 21.34 | 20.84% | 35.42 | 33.95% | 44.25 | 45.21% |
| | 1946 | 17.91 | | 33.89 | | 48.2 | |
| 6 | 1944 | 22.51 | | 29.97 | | 47.02 | |
| | 1945 | 26.72 | 22.18% | 32.06 | 31.0% | 41.21 | 46.82% |
| | 1946 | 16.86 | | 31.26 | | 51.88 | |
| 12 | 1944 | 24.37 | | 25.75 | | 49.94 | |
| | 1945 | 26.31 | 23.04% | 29.39 | 28.99% | 44.31 | 47.03% |
| | 1946 | 18.26 | | 32.03 | | 49.72 | |
| 9 | 1944 | 15.75 | 15.75% | 36.44 | 36.44% | 47.82 | 47.82% |
| 2 | 1944 | 20.48 | | 30.56 | | 48.96 | |
| | 1945 | 21.62 | 19.78% | 30.83 | 31.3% | 47.54 | 48.92% |
| | 1946 | 16.85 | | 32.73 | | 50.42 | |
| 3 | 1944 | 14.94 | | 37.89 | | 55.17 | |
| | 1945 | 21.34 | 16.9% | 33.76 | 33.72% | 44.91 | 49.38% |
| | 1946 | 15.33 | | 32.29 | | 52.38 | |
| 1 | 1944 | 15.86 | | 29.04 | | 55.10 | |
| | 1945 | 20.23 | 15.73% | 31.83 | 31.97% | 47.94 | 52.3% |
| | 1946 | 10.7 | | 35.29 | | 54.02 | |

The farms are arranged in ascedding order according to the proportion of the supply produced in the spring months.

x Note:- Farmer 13 lost his brewer's grain contract for the period October 1945 until April 1946. This altered the pro-

portions produced in different periods in 1945 and 1946.

Farmer 11 was making considerable alterations in his farming policy during 1944. The conditions for this year on this farm were not normal.

In both cases, the abnormal years have been marked x.

The figures for 1945 for Farm 7 have not been included because of a large alteration in herd numbers in the middle of the year.

Relationship of Proportions Produced in Different Price Periods to Level Production

In order to show the relationship between the proportions produced in the different price periods on the farms and those which would have been produced had production been level, the farms have been grouped according to whether their average proportions fell with a range of ±5% of the level production figure or above or below this range.

Table 7

| | Period | | |
|---|---|---|---|
| | Autumn | Winter | Spring |
| Farms with average proportions within ±5% of level production | 5 | 1,3,4,5,7 13 | 4,5,7,8,10 11 |
| Farms above this range | 8 | 9,10,11 | 1,2,3,6,9, 12,13 |
| Farms below this range | 1,2,3,4, 6,7,9,10 11,12,13 | 2,6,8,12 | |

From this it can be seen that the production on one farm (5) was fairly level throughout the year. In no other case was level production closely approached.

All except two of the farms had production below the level production figure in the autumn period.

Only four farms fell far below the level production figure in the winter period, and three farms were above the "level range".

No farms failed to reach the level production figure in the spring.

## Factors Affecting the Spread of Production

### ENFORCEMENT OF CONTRACTS

During the war years fulfillment of contracts was not enforced by penalties or by lowering of the contract quantity. Consequently there were many periods when farmers supplied less than the quantity they had undertaken to supply.

The following tables show:-

The number of months in which each farmer did not fulfill his contract.

The extent of the deficiencies.

When the deficiencies occurred.

### Fulfillment of Contracts

The following table shows the number of months in each year in which the farmers did not supply sufficient milk to fulfil their contracts.

TABLE 8

| Farmer | Number of Months in Which Contract was not Fulfilled | | |
|---|---|---|---|
| | 1944 | 1945 | 1946 |
| 1 | 6 | 2 | 5 |
| 2 | 4 | 5 | 7 |
| 3 | 7 | 4 | 5 |
| 4 | 11 | 6 | 5 |
| 5 | 0 | 4 | 8 |
| 6 | 0 | 7 | 10 |
| 7 | 4 | 2 | 3 |
| 8 | 7 | | |
| 9 | 4 | | |
| 10 | 12 | 7 | 12 |
| 11 | 4 | 0 | 5 |
| 12 | 6 | 3 | 6 |
| 13 | 2 | 5 | 5 |

It can be seen from the above table that deficiencies in contracts occurred very frequently. For the purpose of estimating the probable supply of milk from these farms as a group, the contracts would be of limited value. In one case in particular - that of Farmer 10, the contract was fulfilled in only five months out of a total of thirty-six. Farmer 4 failed to fulfill his contract in eleven months of 1944, but his performance improved as the contract was reduced.

Extent of Deficiencies

The following table shows the quantities of milk by which the farmers failed to fulfil their contracts as percentages of the total contract quantity for each year.

TABLE 9

| Farmer | Deficiencies as % of yearly contracts 1944 | 1945 | 1946 | Average % |
|---|---|---|---|---|
| 11 | 5.9 | 0 | 4.1 | 3.5 |
| 8 | 4.1 | | | 4.1 |
| 7 | 6.4 | 6.2 | 1.8 | 4.8 |
| 5 | 0 | 2.7 | 12.2 | 5.0 |
| 12 | 6.9 | 3.4 | 7.9 | 6.1 |
| 2 | 2.7 | 2.9 | 13.1 | 6.1 |
| 6 | 0 | 5.5 | 18.0 | 7.8 |
| 1 | 9.2 | 0.6 | 15.4 | 8.4 |
| 4 | 12.1 | 5.3 | 8.9 | 8.8 |
| 13 | 0.9 | 9.9 | 16.7 | 9.2 |
| 3 | 19.4 | 2.7 | 11.3 | 11.1 |
| 9 | 11.9 | | | 11.9 |
| 10 | 25.2 | 6.0 | 15.6 | 15.6 |

Some of the farmers, such as 5 and 6 did not have large deficiencies in 1944 and 1945 but were badly affected by the drought in 1946. In this group there appears to be no relationship between the policy with regard to purchase of feedstuffs and extent of deficiencies.

Times of Occurence of Deficiencies

The following table shows the number of farmers in each month who did not fulfil their contracts.

TABLE 10

| Month | No. of Farmers not Fulfilling Contracts 1944 | 1945 | 1946 |
|---|---|---|---|
| January | 9 | 2 | 10 |
| February | 9 | 3 | 11 |
| March | 8 | 4 | 11 |
| April | 7 | 6 | 10 |
| May | 6 | 3 | 7 |
| June | 6 | 6 | 5 |
| July | 5 | 7 | 7 |
| August | 5 | 4 | 4 |
| September | 4 | 2 | 3 |
| October | 2 | 2 | 3 |
| November | 1 | 2 | 2 |
| December | 2 | 5 | 1 |

NOTE:- The figures for 1944 include all 13 farmers. Those for 1945 and 1946 include 11 farmers only, since records for these years for farmers 8 and 9 were not available.

In both 1944 and 1946 the period when most deficiencies occurred was from January to April inclusive. This covered the drought period in 1946.

During the winter months of June and July approximately half of the farmers in this group did not fulfil their

contracts.

The period when least deficiencies occurred was in the months of October and November.

Although many of these farmers did not fulfil their contracts at some periods of the year, they produced more milk than required to fulfil their contracts at other periods.

The following tables show the extent of these surpluses and when they occurred.

Quantities of Surplus Milk

The following table shows quantities of milk produced above the level required to fulfil contracts as percentages of the total supplies.

TABLE 11

| Farmer | Surplus milk as percentage of total supply | | | Av. % |
|---|---|---|---|---|
| | 1944 | 1945 | 1946 | |
| 10 | 0 | 1.4 | 0 | 0.5 |
| 4 | 0.3 | 4.0 | 8.5 | 4.3 |
| 8 | 6.6 | | | 6.6 |
| 6 | 13.8 | 5.8 | 2.7 | 7.4 |
| 3 | 9.3 | 9.3 | 8.5 | 9.0 |
| 5 | 14.1 | 9.8 | 4.5 | 9.5 |
| 7 | 10.9 | 11.2 | 7.9 | 10.0 |
| 2 | 12.5 | 11.4 | 6.7 | 10.2 |
| 12 | 11.4 | 11.2 | 7.9 | 10.2 |
| 9 | 12.9 | | | 12.9 |
| 11 | 16.8 | 28.3 | 14.4 | 19.8 |
| 1 | 23.0 | 21.1 | 23.5 | 22.5 |
| 13. | 33.9 | 23.8 | 12.4 | 23.4 |

The quantity of milk surplus to contract quantities produced varied from practically nil to almost a quarter of the total supply. In two of the cases where a larger quantity of surplus milk was produced (11 and 13) the contracts were raised and the surplus was reduced.

Since an allowance was made for a proportion of milk above the contract quantity to be paid for at full town milk price (10% per month up to and including August 1946, and 17% for the total for the 5 months September 1946 to January 1947 inclusive) the quantity of milk supplied above the contract quantity plus the "allowed surplus" has been shown in the following table as a percentage of the total supply. This surplus milk has been termed "extra surplus milk" in the table.

TABLE 12

| Farmer | "Extra surplus" milk as % of total supply 1944 | 1945 | 1946 | Average% |
|---|---|---|---|---|
| 10 | 0 | 0 | 0 | 0 |
| 4 | 0 | 4.3 | 2.0 | 2.1 |
| 8 | 2.9 | | | 2.9 |
| 5 | 6.6 | 4.2 | 0.1 | 3.6 |
| 6 | 7.3 | 3.6 | 0 | 3.6 |
| 12 | 7.3 | 5.2 | 2.0 | 4.8 |
| 2 | 8.0 | 6.8 | 0.5 | 5.1 |
| 3 | 10.4 | 4.5 | 3.2 | 6.0 |
| 7 | 9.1 | 10.4 | 0 | 6.5 |
| 9 | 7.4 | | | 11.2 |
| 11 | 11.2 | 21.3 | 10.4 | 14.3 |
| 1 | 19.1 | 15.7 | 11.5 | 15.4 |
| 13 | 29.0 | 19.5 | 16.8 | 21.8 |

The order of farmers in this table differes from that of the previous table because some farmers produced a surplus in a few months, thereby having a larger proportion of "extra surplus" milk than those whose surplus was spread over a longer period.

This table shows the proportions of each supply which would theoretically be sold at butterfat prices. The fact that this had not always happened is explained in the section on prices of town milk.

TABLE 13

| Month | No. of farmers supplying "extra surplus" milk 1944 | 1945 | 1946 |
|---|---|---|---|
| January | 0 | 9 | 0 |
| February | 1 | 5 | 0 |
| March | 5 | 5 | 0 |
| April | 4 | 4 | 1 |
| May | 5 | 2 | 1 |
| June | 3 | 2 | 2 |
| July | 3 | 3 | 3 |
| August | 5 | 2 | 1 |
| September | 8 | 7 | |
| October | 10 | 8 | |
| November | 11 | 6 | |
| December | 10 | 3 | |
| Sept.-Dec. inclusive | | | 5 |

NOTE:- The figures for 1944 include 13 farmers, those for 1945 and 1946, 11 farmers.

Because of the increased "allowed surplus" in the period September to December 1946 inclusive fewer farmers supplied "extra surplus" milk at that time than in the same period of the two previous years.

More farmers supplied "extra surplus" milk in the months of September, October and November than at any other

period. In January and February of 1944 and 1946 the number of suppliers af extra surplus milk was least. The favourable climatic conditions in early 1945 increased the number for that period.

It is to be expected that contracts might not be fulfilled during a severe drought such as that of early 1946. However, even if this period is not considered fulfilment of contracts was poor. Milk surplus to the contract quantities and to the contract quantity plus the surplus allowed at full price was produced at times. Strict enforcement of contracts would have caused more nearly level production on many farms.

The effect of the contracts has been to cause production to tend to be more or less level. However the non-enforcement of the contracts has had the opposite effect, production in the summer and early autumn period being particularly low on most of the farms.

PAYMENT FOR TOWN MILK

Prior to September 1944 the Metropolitan Milk Council of Auckland controlled prices paid for town milk. Since this time price control has been vested in the Price Tribunal.

Over the period covered by the survey, considerable changes occurred in the prices paid for town milk. One company which formerly paid on a butterfat basis, altered its system to payment on a gallonage basis, that at present used by all the treating houses supplied by the farmers in this survey.

Prices Paid for Milk

In order to encourage production when milk was in short supply, different prices have been paid at different periods of the year.

Prices during the 1945/6 season were as follows:-

| | | | | | |
|---|---|---|---|---|---|
| September (1945) | to January (1946) | incl. | 12.00 | pence | per g. |
| February | to April | " | 15.00 | " | " " |
| May | to August | " | 18.3 | " | " " |

Suppliers maintaining their contracts plus the surplus allowed at full prices (10% per month) would have received an average price of 14.85 pence per gallon, had no deductions for low test been made.

This was carried further in the 1946/7 season.

| | | |
|---|---|---|
| September to January inclusive | 12.75 | pence per gallon |
| February to April " | 15.00 | " " " |
| May to August " | 20.36 | " " " |

Average price per gallon (on milk supplied as above) 15.63 pence. The price paid for surplus milk up to 10% of the contract in the winter was not the full price for winter milk, but 15.63 pence per gallon.

In order to encourage winter milk production, the winter price was raised considerably. In addition the farmers received a better price for spring milk, particularly since the surplus paid for at full price was raised to 17% of the total for the five months September to January.

Milk supplied above the quantity paid for at full town milk prices was used for cheese or butter manufacture and was paid for at the current rates for butterfat, with small deductions for transport and handling charges, and for separating if required.

Prices on a Gallonage Basis Prior to September 1945

The prices paid on a gallonage basis prior to September 1945 were lower than in later years, and the higher price paid for winter milk was not so pronounced, but the winter price perio was longer.

The following prices were paid from January 1944

| | | | |
|---|---|---|---|
| 1944 January and February inclusive | 10.25 | pence per gal. | |
| March to August " | 1/2.25 | " " " | |
| September to December " | 10.25 | " " " | |
| 1945 January | 11.5 | " " " | |
| February to April " | 1/2.5 | " " " | |
| May to August " | 1/5½ | " " " | |

In addition a payment of 0.33 per gallon (Farm Cost Allowance) was made from March 1944 until December 1944 inclusive From September until December 1944 an additional payment of a subsidy of .75 pence per gallon was made on town milk supplied.

Payment on Butterfat Basis

Prior to March 1945 when payment under the National Milk Scheme (on a gallonage basis) came into operation, one company paid for milk on the basis of butterfat content. Under a strongly competitive system such as that which used to operate in Auckland the attractiveness of milk to the customer was an important consideration. This depended mainly on colour and cream line. Payment on a butterfat basis encouraged the production of higher test milk.

The same system of price changes to encourage the production of milk during periods of poor pasture growth was used.

The following were the prices paid per pound of butterfat.

| | |
|---|---|
| 1944 January and February | 1/10½ |
| Marcy to May inclusive | 2/6 |
| June | 2/8 |
| July | 2/7 |
| August | 2/9½ |
| September | 1/10 |
| October | 1/8 |
| November 1944 to January 1945 inclusive | 1/9 |
| February 1945 | 1/10 |

In addition to these payments on a butterfat basis additional payments were made on a gallonage basis. From March 1944 until February 1945 inclusive, an allowance of 0.33 pence (Farm Cost Allowance) per gallon, and in addition, in February 1945 a Government Bonus of 3.91 pence per gallon was paid.

Consequently, over most of this period basic payments were made on a butterfat basis and additional allowances and bonuses on a gallonage basis.

Subsequent to February 1945 payments in this case were as those for the same periods in the previous section.

Relationship Between Payment for Town Milk and Spread of Production

Whatever basis of payment has been used, the differential prices paid at different periods have been desinged to affect the spread of production on farms. In particular the production of winter milk has been encouraged by a high price per gallon at that time. How much the differential prices have affected spread of production on most of these farms is not clear. However farmers 10 and 11, both of whom used considerable quantities of purchased feedstuffs, produced a greater proportion of winter milk than required to maintain level production. In the autumn period when the price was lower, they did not maintain their production at this high level.

Payment of Members of Producers' Associations.

Since the Producers' Associations have been responsible for the supply to the treating houses they have also been responsible for payment of their members. In some months more milk has been supplied within the contract quantities allotted to the members than could be used for town milk purposes. Because of this members have in these months been paid at full town milk rates for only a proportion of the milk supplied within their contract quantities. Records kept by one farmer showed that the minimum proportion of his contract quantity paid for at full rates in any month was 80%.

## PROPORTION OF THE HERD IN MILK

The proportion of a herd in milk at different periods will influence the spread of production.

The following tables show the percentage of the cows in each herd in milk in each month of the three years.

NOTE:- As stated earlier, these figures are based on farmers' estimates and on records which, in some cases at any rate, are likely to be unreliable. The basis of the figures used has been indicated in each case. It is emphasised that they can be considered only as indications of tendencies.

The sources of the figures used have been indicated as follows:-

| | |
|---|---|
| Milk Board Records | MB |
| Farmer's Estimate | EST. |
| Herd Test Records | TR |

Herds with greatest proportion of the herd in milk in the winter months

TABLE 14

| Month | 4 | | | 6 | 10 | | |
|---|---|---|---|---|---|---|---|
| | 1944 | 1945 | 1946 | EST | 1944 | 1945 | 1946 |
| Jan. | 69 | 61 | 82 | 75 | 51 | 63 | 63 |
| Feb. | 64 | 59 | 82 | 75 | 50 | 67 | 67 |
| Mar. | 67 | 67 | 70 | 71 | 60 | 71 | 68 |
| Apr. | 69 | 72 | 77 | 79 | 69 | 71 | 79 |
| May | 69 | 75 | 82 | 82 | 69 | 70 | 72 |
| June | 80 | 78 | | 84 | 70 | 71 | 75 |
| July | 75 | 75 | | 86 | 71 | 75 | 75 |
| Aug. | 72 | 75 | | 86 | 70 | | 75 |
| Sept. | 67 | 78 | | 79 | 67 | | 75 |
| Oct. | 69 | 80 | | 80 | 65 | | 67 |
| Nov. | 69 | 73 | | 75 | 67 | | 63 |
| Dec. | 60 | 52 | | 75 | 65 | | 58 |
| Source | MB | MB | MB | EST | MB/EST | MB | EST |

Herds with greatest proportion of the herd in milk in the spring months

TABLE 15

| Month | 1 | 2 | | 11 | | |
|---|---|---|---|---|---|---|
| | EST | 1944 | EST | 1944 | 1945 | 1946 |
| Jan. | 83 | 80 | 91 | 76 | 56 | 68 |
| Feb. | 77 | 83 | 85 | 64 | 43 | 68 |
| Mar. | 74 | 85 | 85 | 61 | 53 | 68 |
| Apr. | 68 | 68 | 85 | 57 | 65 | 68 |
| May | 62 | 60 | 85 | 65 | 61 | 68 |
| June | 77 | 62 | 85 | 55 | 64 | 68 |
| July | 92 | 68 | 85 | 56 | 65 | 62 |
| Aug. | 100 | 85 | 92 | 56 | 71 | 63 |
| Sept. | 100 | 85 | 100 | 57 | 69 | 74 |
| Oct. | 95 | 96 | 100 | 59 | 74 | 74 |
| Nov. | 92 | 100 | 92 | 61 | 79 | 68 |
| Dec. | 89 | 100 | 96 | | | 68 |
| Source | EST | MB | EST | MB | MB | MB/EST |

Herd with least cows in milk in the winter and greatest numbers in the spring, summer and autumn

TABLE 16

| | 7 | | |
|---|---|---|---|
| | 1944 | 1945 | 1946 |
| Jan. | 89 | 93 | 84 |
| Feb. | 82 | 89 | 96 |
| Mar. | 89 | 91 | 96 |
| Apr. | 83 | 84 | 87 |
| May | 82 | 95 | 74 |
| June | 79 | 70 | 68 |
| July | 84 | 74 | 70 |
| Aug. | 85 | 92 | 88 |
| Sept. | 82 | 88 | 100 |
| Oct. | 84 | 88 | 96 |
| Nov. | 86 | 90 | 98 |
| Dec. | 89 | 92 | 92 |
| Source | MB EST | MB TR | EST |

Herd with the same number in milk throughout the year.

Herd 5 :- 77% in milk each month.

The figures for the remaining farms do not show such clearcut tendencies as the previous ones. Farm 12 showed some tendency to have the greatest number of cows in milk in the spring.

TABLE 17

| | Farm 3 | Farm 9 | | Farm 12 | | | Farm 13 | | |
|---|---|---|---|---|---|---|---|---|---|
| | EST | 1944 | 1945 | 1944 | 1945 | 1946 | 1944 | 1945 | 1946 |
| Jan. | 93 | 75 | | 80 | 83 | 86 | | | 67 |
| Feb. | 85 | 80 | | 75 | 77 | 72 | 49 | 74 | 67 |
| Mar. | 71 | 75 | | 77 | 89 | 80 | 51 | 85 | 73 |
| Aprl. | 71 | 75 | | 83 | 89 | 80 | 51 | 88 | 80 |
| May | 71 | 85 | | 83 | 92 | 80 | | 88 | 95 |
| June | 76 | 85 | | 74 | 86 | 80 | | 83 | 95 |
| July | 85 | 90 | | 66 | 86 | 80 | | 83 | 95 |
| Aug. | 71 | 85 | | 72 | 83 | 86 | 81 | | 95 |
| Sept. | 74 | 85 | | 63 | | 92 | 84 | | 95 |
| Oct. | 71 | 85 | | 80 | | 100 | 84 | | 95 |
| Nov. | 86 | 90 | | 86 | | 100 | 85 | | 95 |
| Dec. | 93 | 90 | | 89 | | 92 | 85 | | 95 |
| Source | EST | MB | | MB | MB | EST | MB | MB | EST |

These farms also show great variation between the proportions of the herds normally in milk. Herd 11 shows a low percentage in milk at ~~all~~ periods, and in herd 7 a greater proportion of the herd is in milk all the time.

Herd 4 shows variations between the numbers in milk at the same periods of different years. The proportion of milkers increased during the drought period of early 1946.

Relationship Between Number of Cows in Milk and Spread of Production

Winter Period

Farmers 4, 6 and 10 had the greater proportions of their herds in milk in the winter months. Herd 4 produced within 5% of the proportion required for level production, herd 10, above, and herd 6, below this proportion.

Spring Period

Farmers 1, 2 and 11 had the greatest proportions of their herds in milk in the spring months. Herd 11 produced within 5% of the level production proportion, and herds 1 and 2, above this proportion. Farmer 7 had the lowest proportion of cows in milk in the winter; despite this his herd produced within 5% of the level production figure.

Level Production

Farmer 5 had approximately the same number of cows in milk throughout the year and the production of his herd was more or less level.

It can be seen that there was no general relationship between the proportion of the herd in milk at any period and the proportion of the supply produced in that period.

CALVING DATES

The proportion of freshly calved cows will influence the production of a herd at any period. If feeding is inadequate, by use of their accumulated body reserves, fresh cows can maintain production at a higher level than those cows which have been in milk for a longer time. If feeding is adequate, fresh cows are capable of a higher level of production than cows at a later stage of lactation. Even if well fed good cows usually "milk off" a portion of their body reserves after calving.

The information on calving dates which was available was very much less that would be expected on farms where planning of production should be so important.

In three cases a record was available. In one case

the herd test book was available but did not include all the herd so an estimate was given in addition. The test book figures provided a check on the estimate. They do not agree in detail but show peaks and slack periods at about the same time of theyear.

Farmer 10 also tested but considered that the number of untested cows in the herd was so great that herd test records would be misleading. He would give an estimate only. Farmer 4 would not commit himself to figures, but indicated the peaks and slack periods in his calving system.

The following table shows the calving plans.

TABLE 18

Percentage of the Herd Calving Each Month

| Farm | Basis of Figures | Jan. | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | Test Book 1946-1947 | 18 | 0 | 10 | 6 | 5 | 10 | 19 | 19 | 2 | 10 | 0 | 2 |
| " | Estimate | 16 | 2 | 4 | 7 | 4 | 12 | 25 | 9 | 5 | 2 | 9 | 7 |
| 1 | Estimate | 0 | 3 | 8 | 12 | 16 | 26 | 16 | 8 | 4 | 2 | 2 | 2 |
| 6 | Estimate | 3 | 6 | 9 | 11 | 13 | 16 | 13 | 7 | 4 | 7 | 7 | 7 |
| 12 | Estimate | 2 | 4 | 15 | 15 | 10 | 21 | 10 | 12 | 4 | 6 | 0 | 0 |
| 3 | Estimate | 8 | 15 | 1 | 15 | 21 | 8 | 0 | 1 | 8 | 8 | 15 | 0 |
| 4 | Estimate | Start Calving | | | Main Peak | | | | | As few as possible | | | |
| 9 | Record 1944 | 7 | 0 | 14 | 33 | 16 | 11 | 6 | 6 | 11 | 4 | 2 | 2 |
| 11 | Record 1946 | 6 | 2 | 25 | 18 | 4 | 4 | 10 | 7 | 3 | 0 | 7 | 13 |
| 13 | Estimate | 2 | 17 | 48 | 12 | 12 | 2 | 2 | 1 | 1 | 0 | 0 | 0 |
| 8 | Record 1944 | 12 | 12 | 18 | 21 | 9 | 3 | 3 | 6 | 3 | 3 | 3 | 6 |
| 10 | Estimate | 7 | 14 | 11 | 11 | 11 | 11 | 11 | 5 | 5 | 4 | 4 | 6 |
| 2 | Estimate | 11 | 11 | 11 | 11 | 11 | 11 | 4 | 7 | 8 | 0 | 4 | 11 |
| 5 | Estimate | 8 | 8 | 10 | 10 | 10 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |

Major calving peaks have been underlined in red, and minor calving peaks in black.

Since it is reasonable to expect that a farmer would know in which months a large number of his cows calved and in which few came into the milking herd, it can be taken that these estimates indicate the peaks and low periods in the calving plans sufficiently accurately.

These calving systems may be described as follows:-

(a) Winter calving peaks.

These may overlap into a partical early spring peak.

(i) A minor calving peak in the summer, followed by a lull in claving during the autumn and a late winter calving

peak. This is shown by farm 7.

(ii) No minor calving peak in the summer, but a steady build up in calving rate to a rather earlier winter calving peak than in the case of farm 7. Shown by farms 1, 6 and 12.

(b) Autumn calving peaks.

(i) A minor calving peak in the summer, followed by a lull before a main calving peak in the autumn. Shown by farms 3, 4, 9 and 11.

(ii) No minor calving peak in the summer but a steady build up of calving rate from the summer to a main peak in the autumn. The rate of calving builds up earlier in the autumn than on the previous group of farms. Shown by farms 12 and 8.

(c) Systems approaching level calving.

(i) More or less level calving over the summer autumn and most of the winter, with a lower rate in the spring. Farms 2 and 10 show this.

(ii) Almost level calving. Farm 5 shows this well.

In addition farms 3 and 7 have minor calving peaks during October and November, and farm 9 in September. These are in accord with the general policy which is evident from the main and other minor calving peaks. This is to calve the bulk of the herds just before or during periods when pasture growth is poor.

There is no uniformity about the calving systems, the peaks of these farms being spread through the autumn and winter with no two following the same system throughout the year.

Relationship Between Calving Plans and Spread of Production

Since most of the calving plans were designed with the main object of sustaining winter production, the groups of farms with similar calving plans are compared with the proportions of their supply produced in the winter period. Only farms with three years production figures are included.

Those producing with ±5% of the level production proportion are marked L, those above this range A, and those below this range, B.

| Winter Calving Peak | Relationnship to Level Prodn. Winter Period | Autumn Calving Peak | Relationship to Level Prodn. Winter Period |
|---|---|---|---|
| Farm | | Farm | |
| 7 | L | 11 | A |
| 1 | L | 13 | L |
| 6 | B | 3 | L |
| 12 | B | - | L |
| Mainly Autumn & Winter Calving, no Definite Peak | | Level Calving | |
| Farm | | Farm | |
| 2 | B | 5 | L |
| 10 | A | | |

One herd (11) with an autumn calving peak and one (10) with no definite peak but calving mainly in the autumn and winter produced a large proportion of winter milk. Herd 5 with level calving attained level production over the winter.

Despite the calving systems used, herds 6, 12 and 2 did not attain the level production proportion in the winter period, and herds 7, 1, 13, 3, and 4 attained but did not greatly exceed this proportion.

THE STANDARD OF FEEDING OVER THE YEAR

Under a grassland system of farming it is not possible to obtain an estimate of the intake of nutrients of cows. Neither the quantity nor the quality of the foodstuffs they consume is measured.

Consequently the only indication of the standard of feeding of animals at different times is that which can be gained from their productive performance. Such a method of estimation has limitations. At times it is not possible to determine whether feeding is the main factor limiting production or whether it is inherent ability or stage of lactation or some environmental factor other than feeding which is responsible.

However, inspection of the average production of the cows of a herd at various stages after the main calving peak can give an indication as to adequacy of feeding at certain periods. Comparisons between the performance of animals in the same periods of different years on the same farm can give

some guide to adequacy of feeding, particularly to the reserves of supplements used.

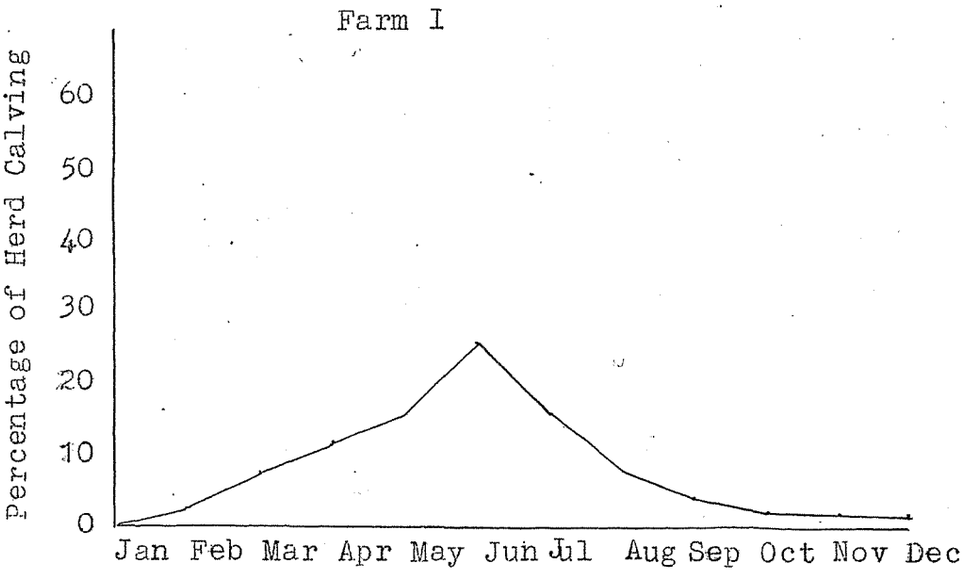
The following graphs show (a) the calving system of each farm expressed as the percentage of the herd calving in each month, and (b) the average daily per cow production in gallons of each herd measured at monthly intervals.

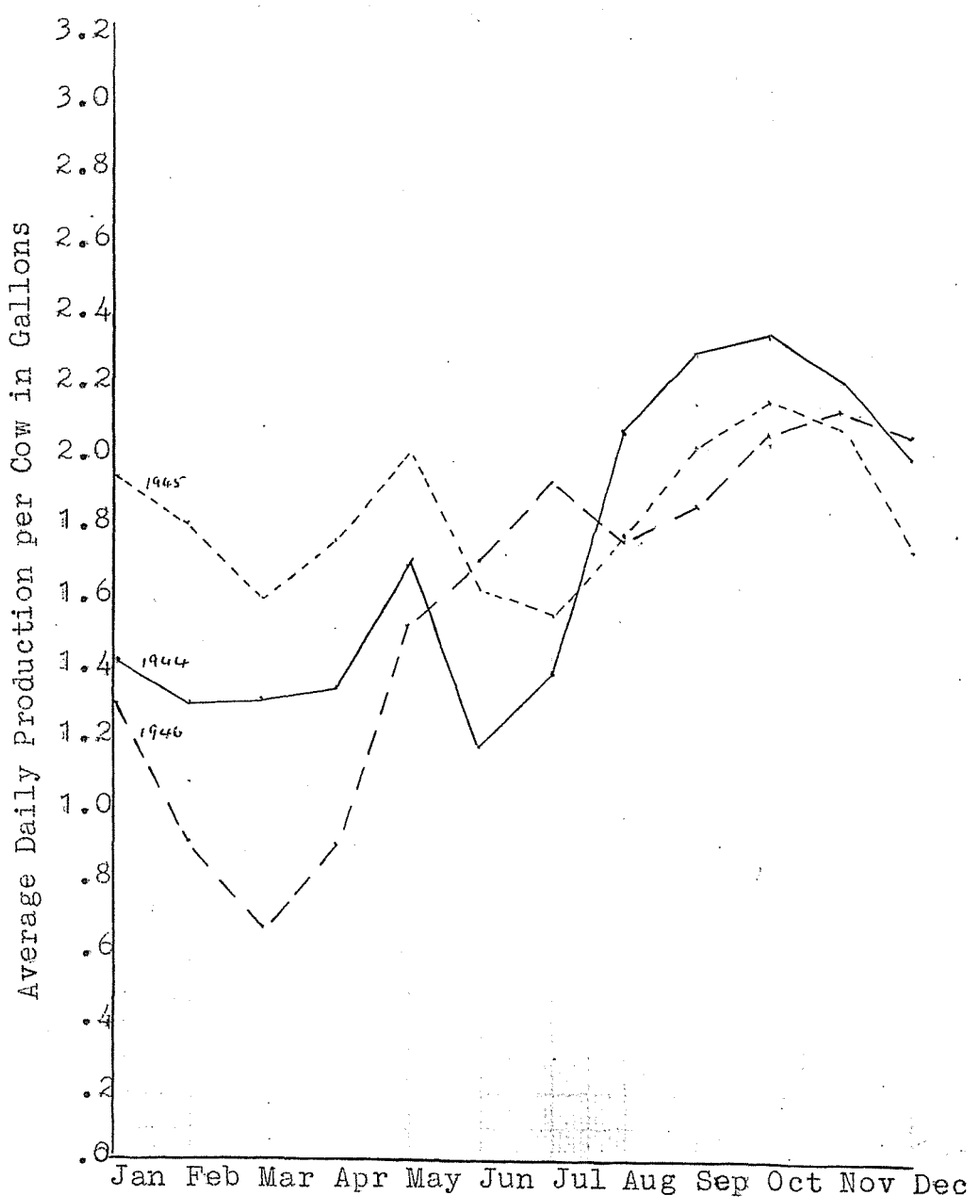
It must be remembered that the curves showing calving plans are, in most cases, based on estimates of the number of cows in milk during the month. Where records were available they have been used. Where the curves are based on estimates, small fluctuations may be due to inaccurate stock numbers and must be disregarded. However, most of the graphs clearly indicate the general standards of feeding on the farms.

In the following section, "inadequate feeding" does not mean that the cows were suffering severe starvation, but that the average level of production could have been raised by better feeding. How much higher cannot be determined. The animals in low producing herds may not appear to be underfed. This applies particularly to those cows tending towards a beef type which will lower milk production considerably before their own body condition falls.

Because of the unusually severe conditions prevailing during the drought period in early 1946, most of the graphs show a marked fall in production at that period. In considering the stand of nutrition on the farms, little attention has been paid to this period, greater consideration being given to that in more normal periods.

Farm I


Percentage of Herd Calving
60
50
40
30
20
10
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Average Daily Production per Cow in Gallons
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
.0
1945
1944
1946
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

## ANALYSIS OF STANDARD OF FEEDING ON INDIVIDUAL FARMS

### Farm I

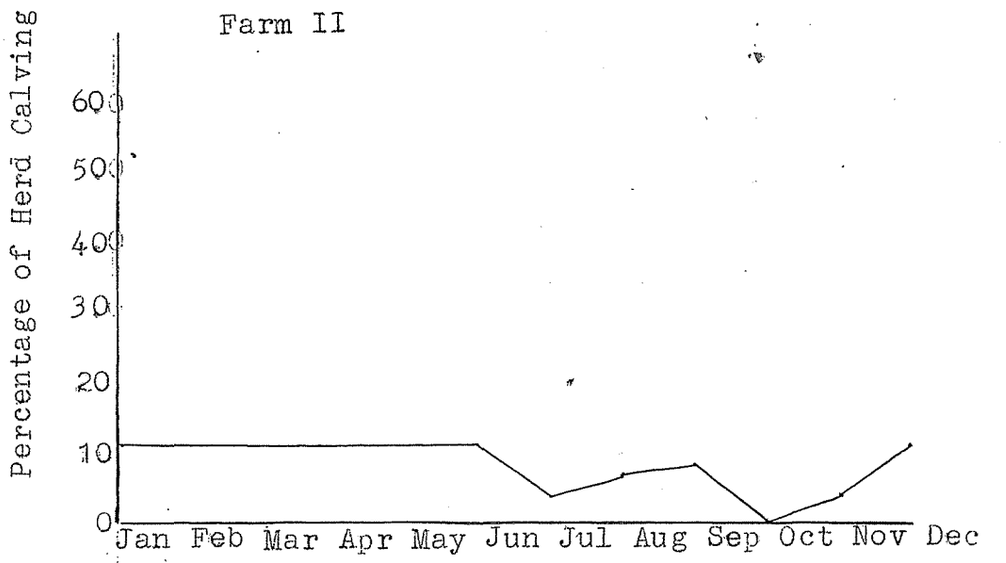
Summer - Early Autumn Period

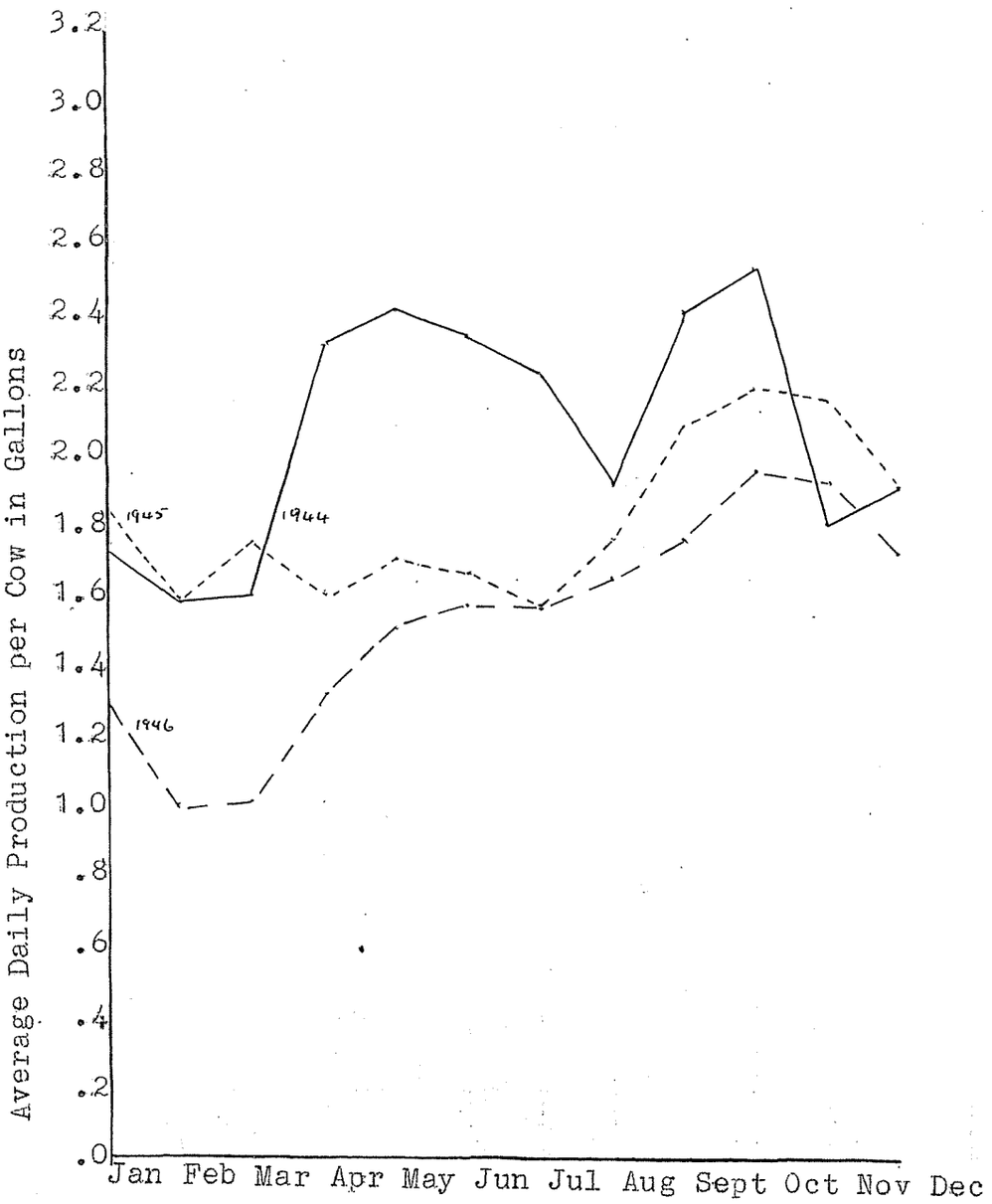
The calving plan shows that this herd was at a low level of potential production at this time, since the bulk of the herd had been milking for about 8 to 9 months. However, production was considerably better in this period of 1945 when grass growth was good, than in the same period of 1944, which was not nearly as favourable for grass growth. Had feeding been adequate during 1944, there would not have been this difference. This indicated a poor level of nutrition in the summer and early autumn, largely a matter of supplementary feeding, during 1944.

Winter and Early Spring Period

Despite a steadily increasing proportion of fresh calvers in the herd from February onwards, production rose only slightly in May, then fell again during the winter, being lowest in June and July (1944 and 1945) when the proportion of fresh calvers in the herd was high. The peak in the average daily per cow production did not come until October or November, 4 or 5 months after the peak calving rate of the herd. This indicates inadequate feeding in the winter and early spring.

Farm II


Percentage of Herd Calving
60
50
40
30
20
10
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Average Daily Production per Cow in Gallons
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
.0
1945
1944
1946
Jan Feb Mar Apr May Jun Jul Aug Sept Oct Nov Dec

Farm II

Summer - Early Autumn Period

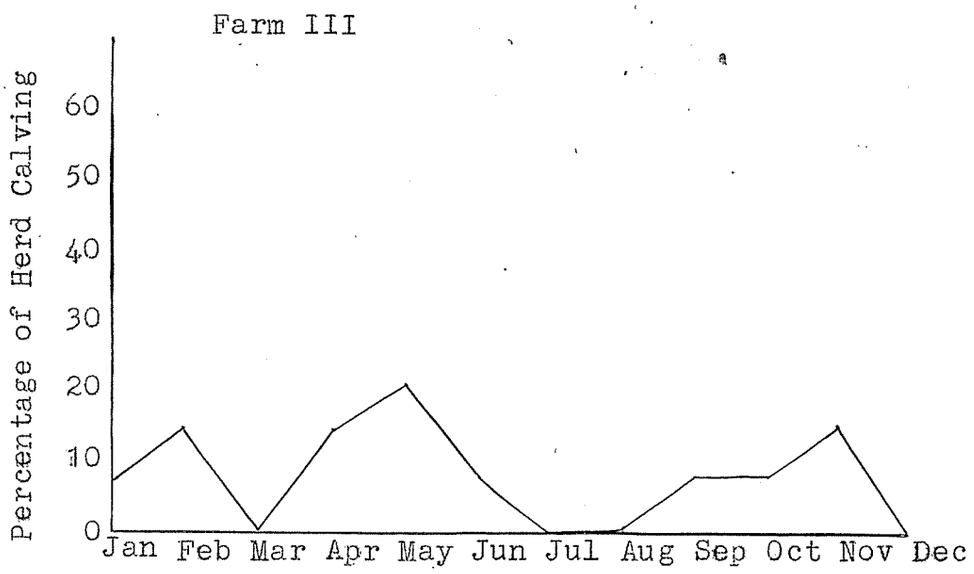
Unlike farm 1, the better season in 1945 at this time made little difference in January, February and March, indicating a good level of nutrition in 1944.

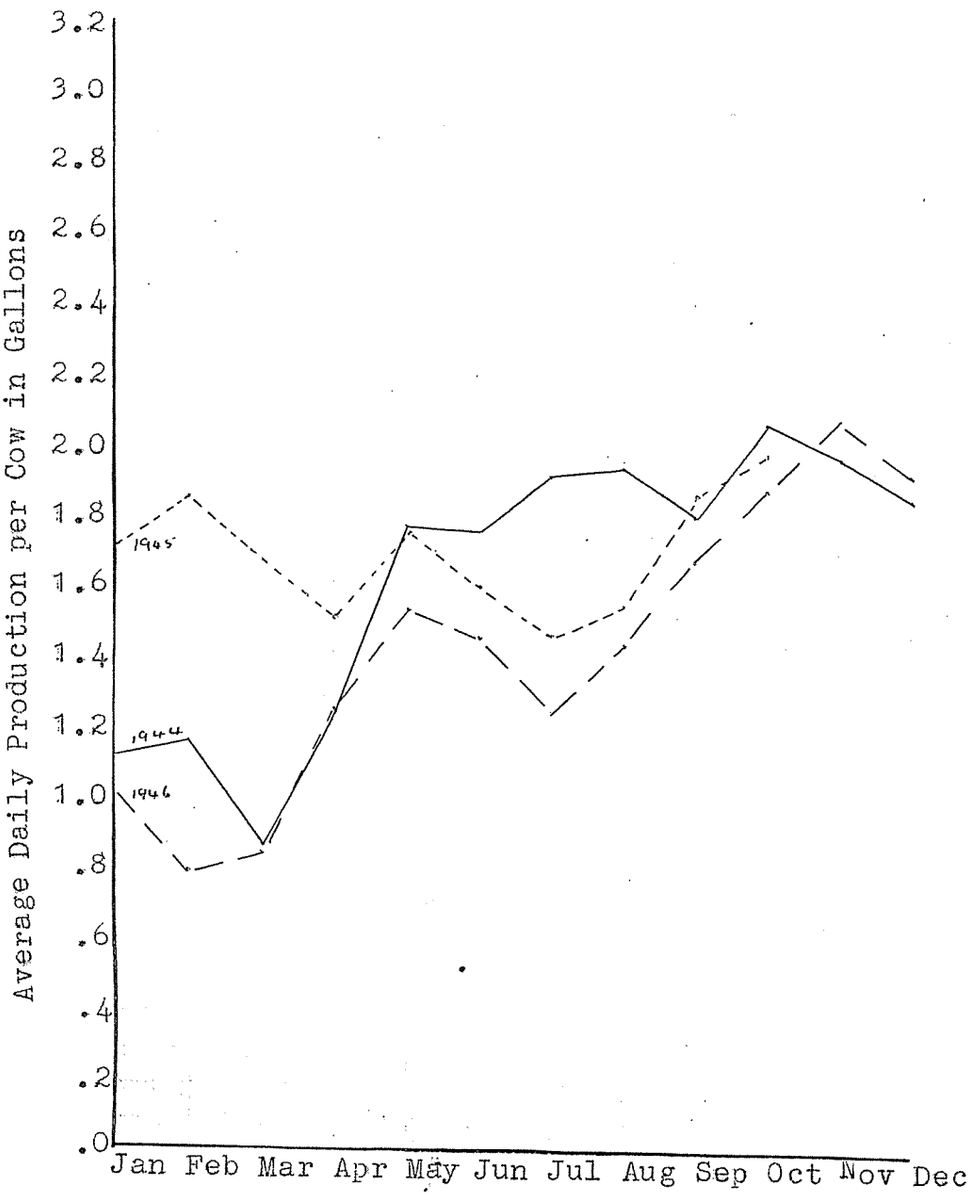
Winter and Early Spring Period

The curves for 1945 and 1946 show that the level of production was highest about October and November, 5 months or so after the rate of calving had fallen during the winter. This indicates inadequate winter and early spring feeding in these years.

The curve for 1944 presented a very different picture. During this winter cow numbers were lower (Table 15) than in the subsequent two years. This apparently resulted in a better standard of nutrition which caused a much higher level of production per cow.

Farm III


Percentage of Herd Calving
60
50
40
30
20
10
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Average Daily Production per Cow in Gallons
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
.0
1945
1944
1946
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Farm III

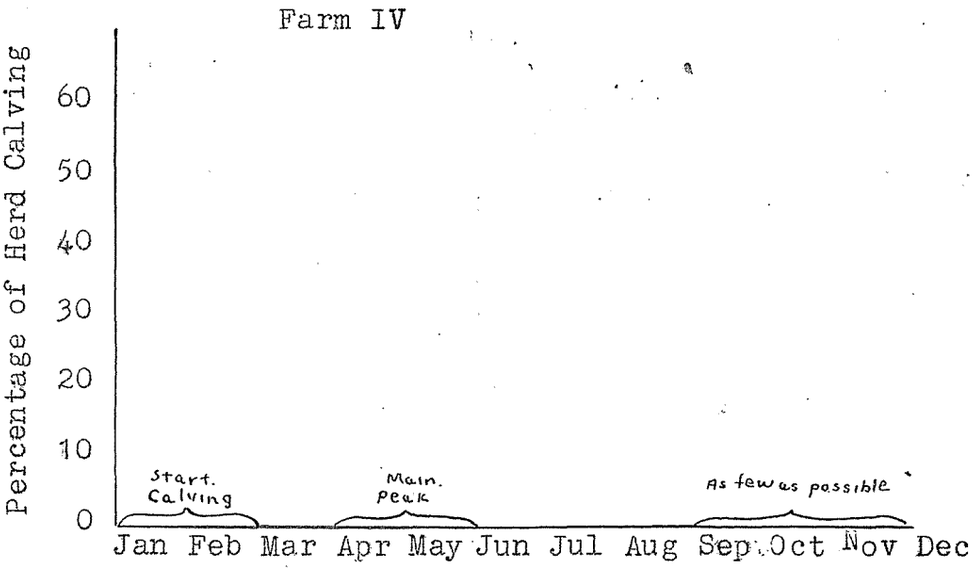
Summer - Early Autumn Period

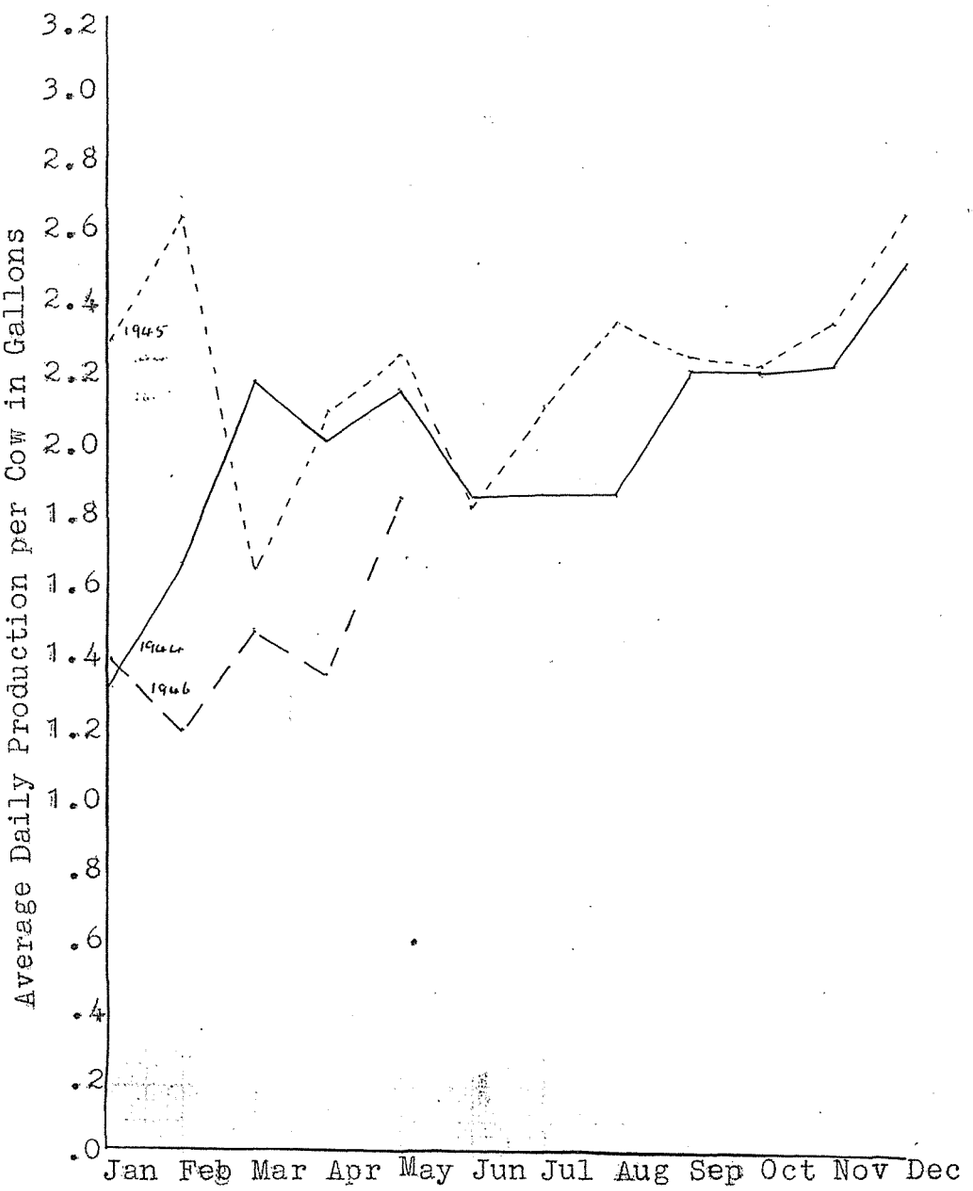
As in the case of Farm 1, the wide difference between the curves for 1944 and 1945 indicates poor feeding in the autumn of 1944. The level of production in this period of 1944 was so poor that some other factor may have been responsible in addition to feeding. The curve is based on records of the numbers of cows in milk, hence is reliable.

Winter and Early Spring Period

Falling production after the main calving peak in two years (1944 and 1946) indicates poor feeding at that time. In all three years, the peak in the daily per cow production came in October and November, 5 - 6 months after the main calving peak. This indicates that the cows were inadequately fed over the winter and early spring.

Farm IV


Percentage of Herd Calving
60
50
40
30
20
10
0
Start. Calving
Main. Peak
As few as possible
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Average Daily Production per Cow in Gallons
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
.0
1945
1944
1946
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Farm IV

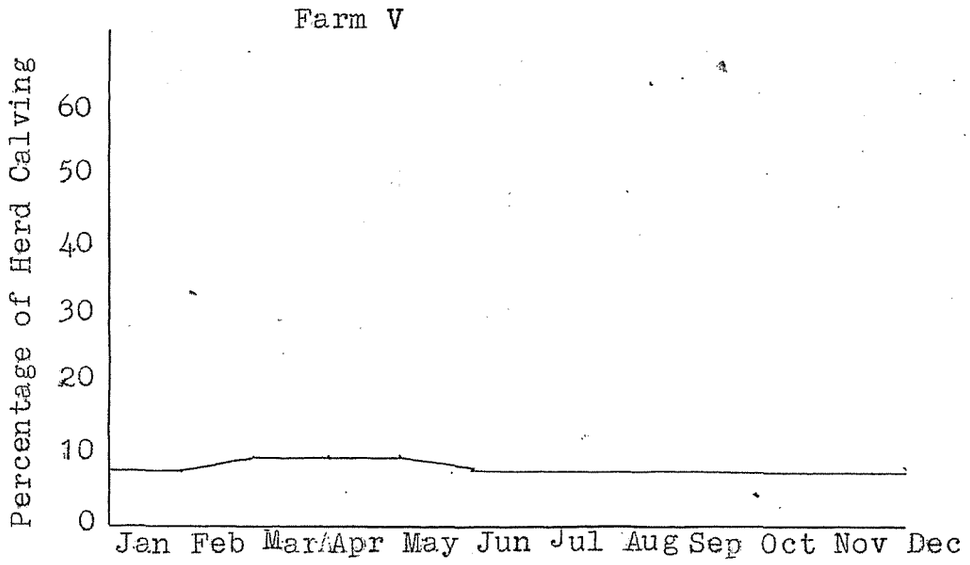
Summer - Early Autumn Period

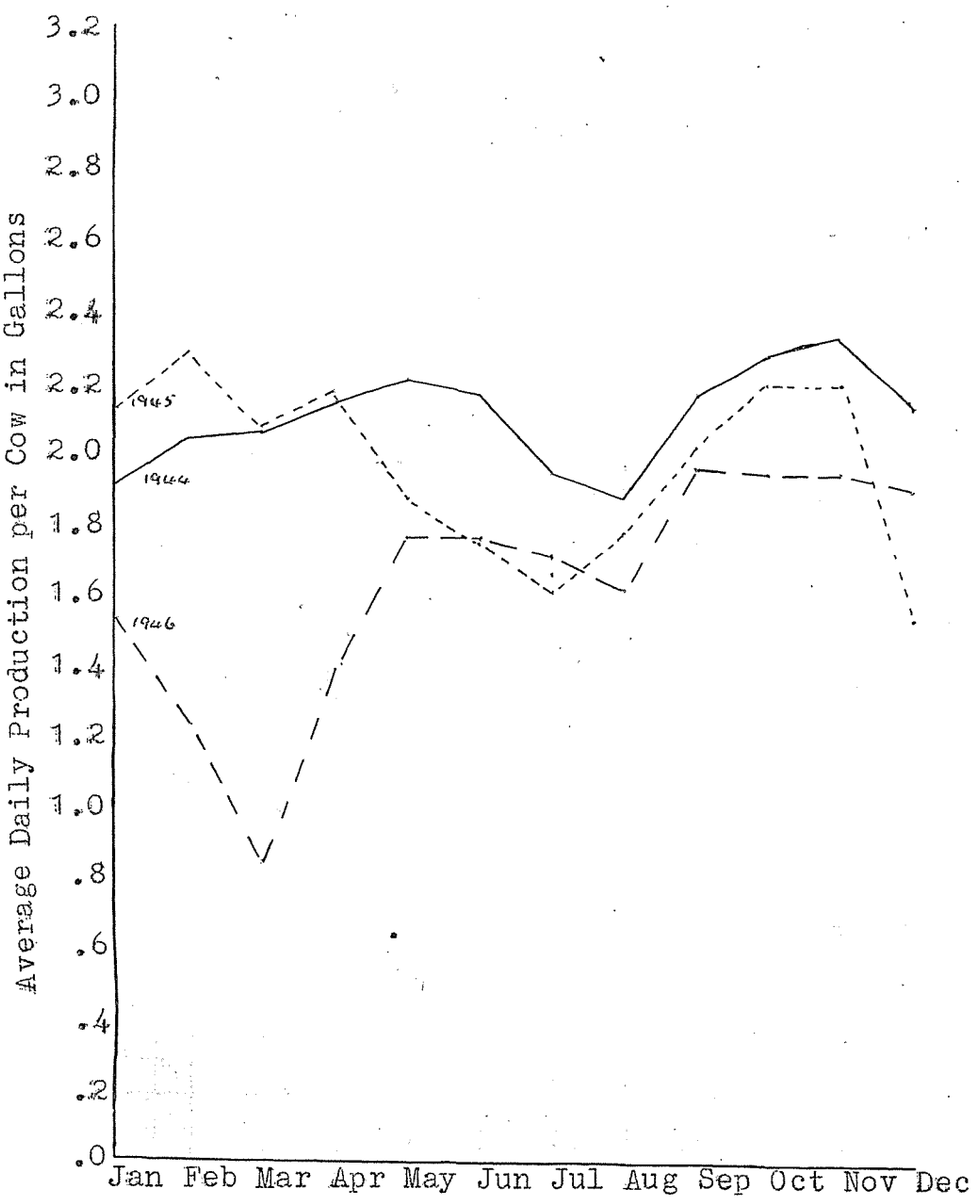
The production curve for early 1945 is erratic. The figures of the number of cows in milk are based on records. There is a possibility that the sudden drop from February to March may have been caused by inclusion of some of the March production in the February returns.

Winter and Early Spring Period

As on the previous farms, the maximum rate of production occurs well after the main calving peak. In this case the lag is about 6 months.

Farm V


Percentage of Herd Calving
60
50
40
30
20
10
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Average Daily Production per Cow in Gallons
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
.0
1945
1944
1946
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Farm V

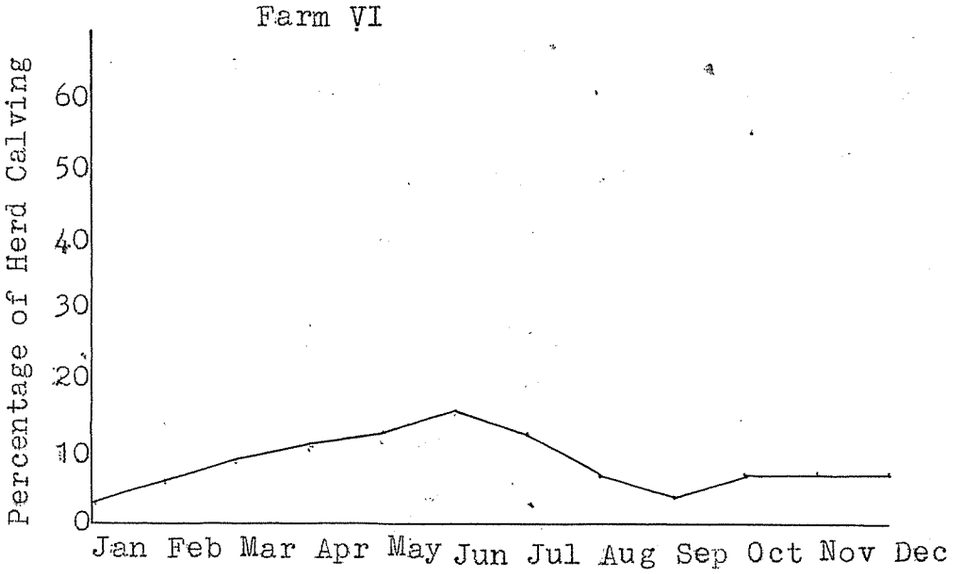
Summer - Early Autumn Period

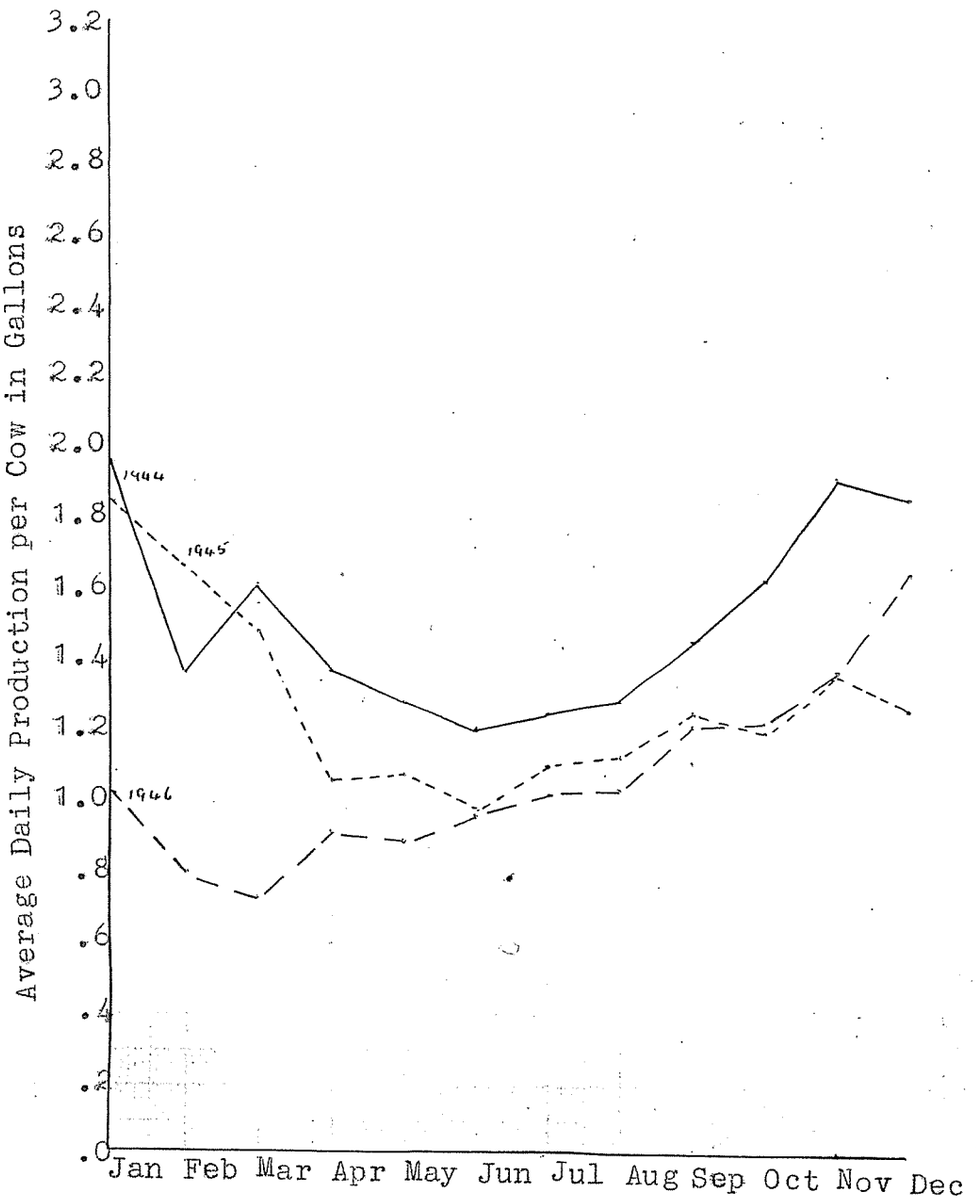
The level of production at this time was about as high as in the spring in 1944 and 1945 indicating a good standard of feeding.

Winter and Early Spring Period

Production per cow fell during all three winters to a lowest level about June and July. This indicates an inadequate plane of nutrition from about May until September or October.

Farm VI


Percentage of Herd Calving
60
50
40
30
20
10
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Average Daily Production per Cow in Gallons
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
.0
1944
1945
1946
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Farm VI

Since the standard of feeding on this farm was poor, it is unfortunate that there were no records of the numbers of cows in milk available and estimates had to be used. However the trends in feeding shown are consistent from year to year

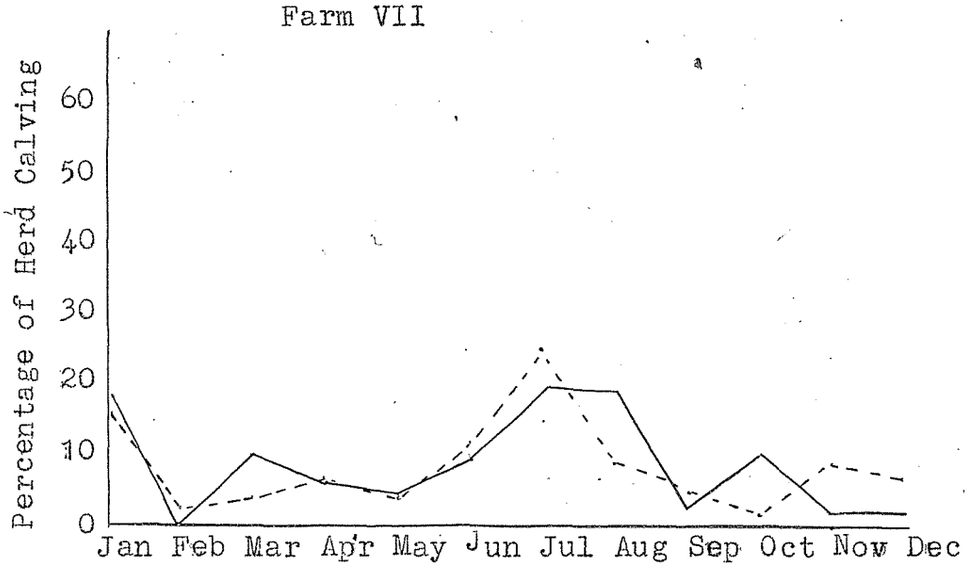
Summer and Early Autumn Period

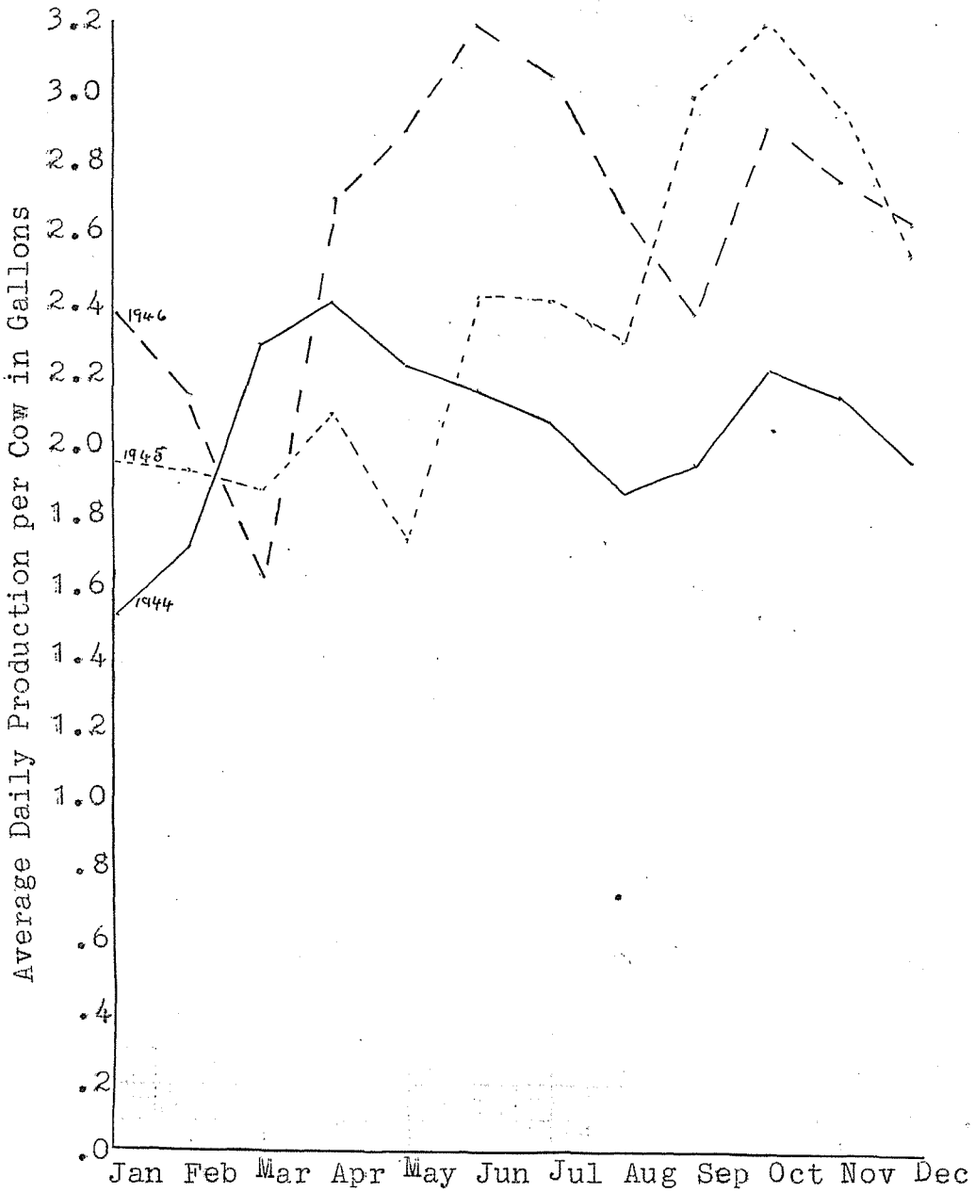
The potential production of the herd was low at this time but the increasing proportion of fresh calves did not prevent the average daily per cow production from falling through a poor level of nutrition.

Winter and Early Spring Period

As the calving rate increased, causing an increased proportion of fresh calvers in the herd, the average daily rate per cow production continued to fall. The peak in productive level came in November and December five to six months after the peak in the calving rate.

Farm VII


Percentage of Herd Calving
60
50
40
30
20
10
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Average Daily Production per Cow in Gallons
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
.0
1946
1945
1944
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Farm VII

This farmer altered his herd numbers from 80 cows to 50 about June and July 1945. The grade Friesians were largely replaced by pedigree Friesians.

Summer - Early Autumn Period

The curves in this period are erratic and do not give any definite indication of the standard of feeding.

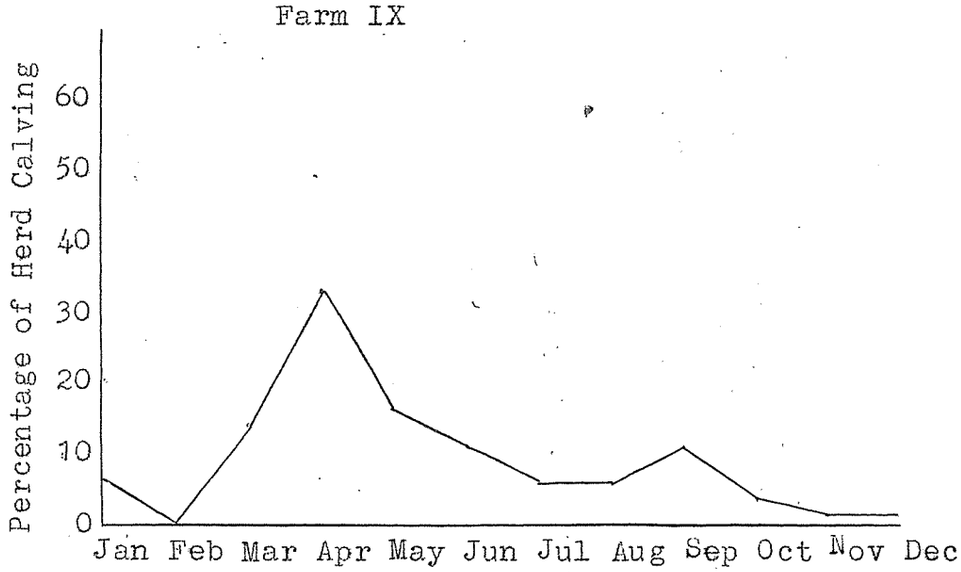
Winter and Early Spring Period

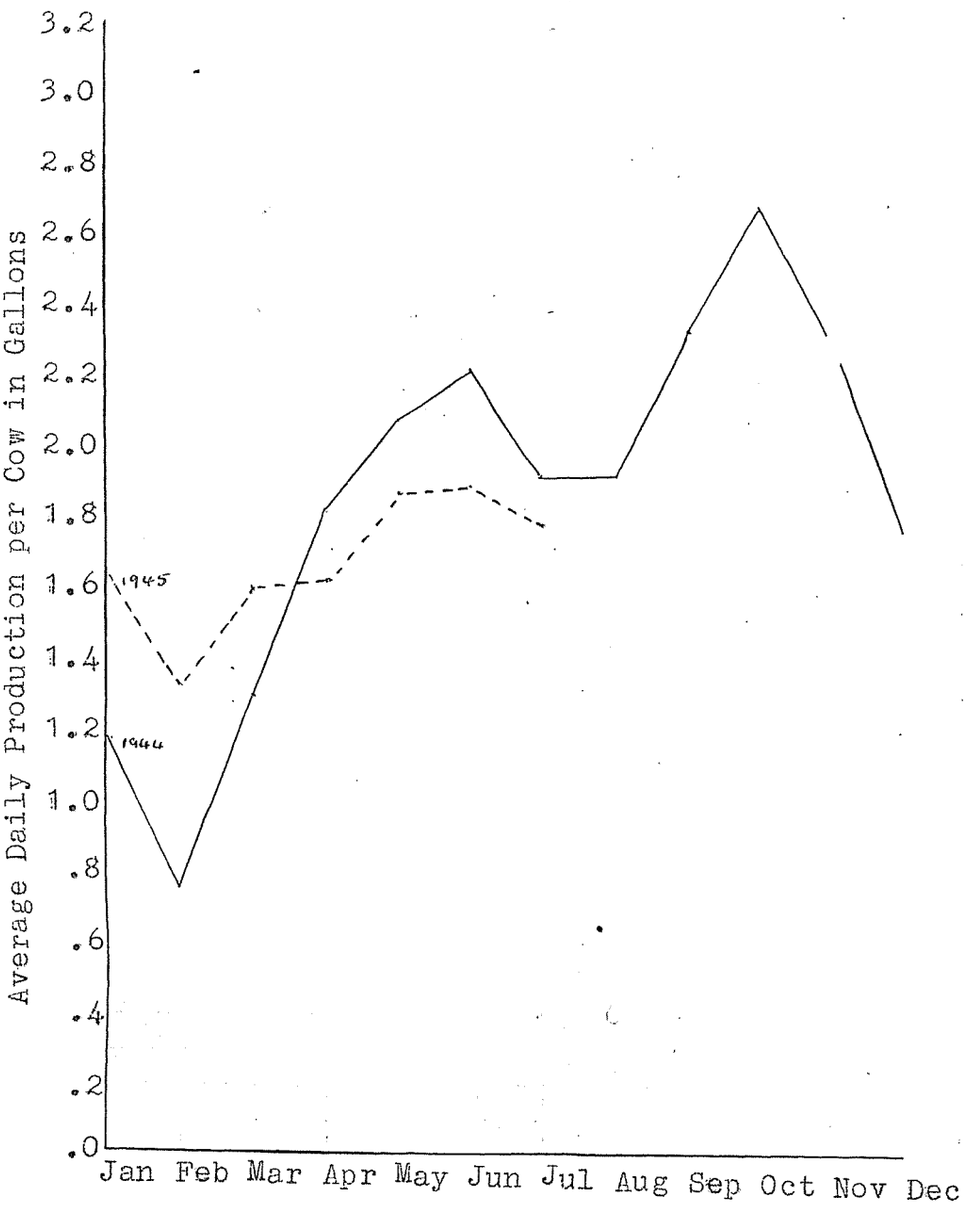
The change in herd numbers and in the cows in mid 1945 was followed by a rise in per cow production in the spring of that year. The much higher level of production in the winter of 1946 indicates a better plane of nutrition at that time since it is not likely that all the increase would be due to using better cows than were in the original herd.

Farm VIII

Production records for this farm were available for 1944 only. No records of the number of cows in milk each month had been kept. Since an estimate would have been of little value in these circumstances no graph for this farm has been included.

Farm IX


Percentage of Herd Calving
60
50
40
30
20
10
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Average Daily Production per Cow in Gallons
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
.0
1945
1944
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Farm IX

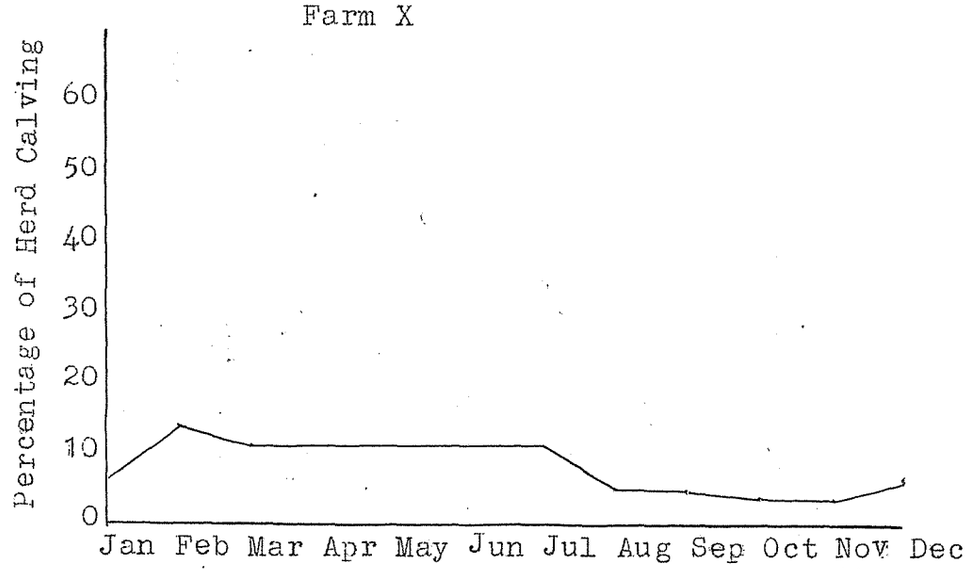
Summer - Early Autumn Period

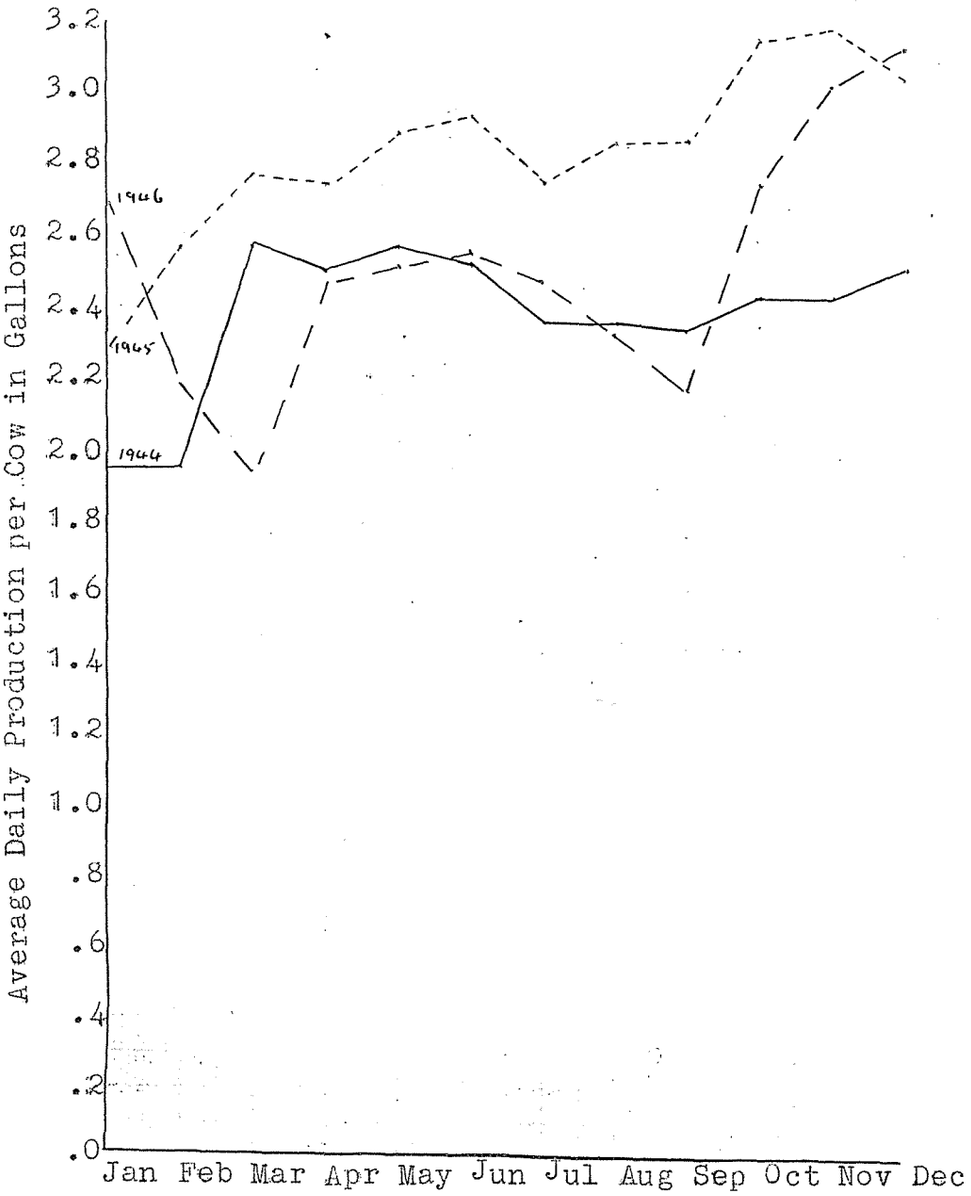
The potential production of this herd was low in the period about January and February, but the production per cow was very low. The better growing season in early 1945 caused an improvement over 1944.

Winter and Early Spring Period

The peak in per cow daily production in October was six months after the calving peak in the autumn, indicating poor winter and early spring feeding.

Farm X


Percentage of Herd Calving
60
50
40
30
20
10
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Average Daily Production per Cow in Gallons
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
.0
1946
1945
1944
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Farm X

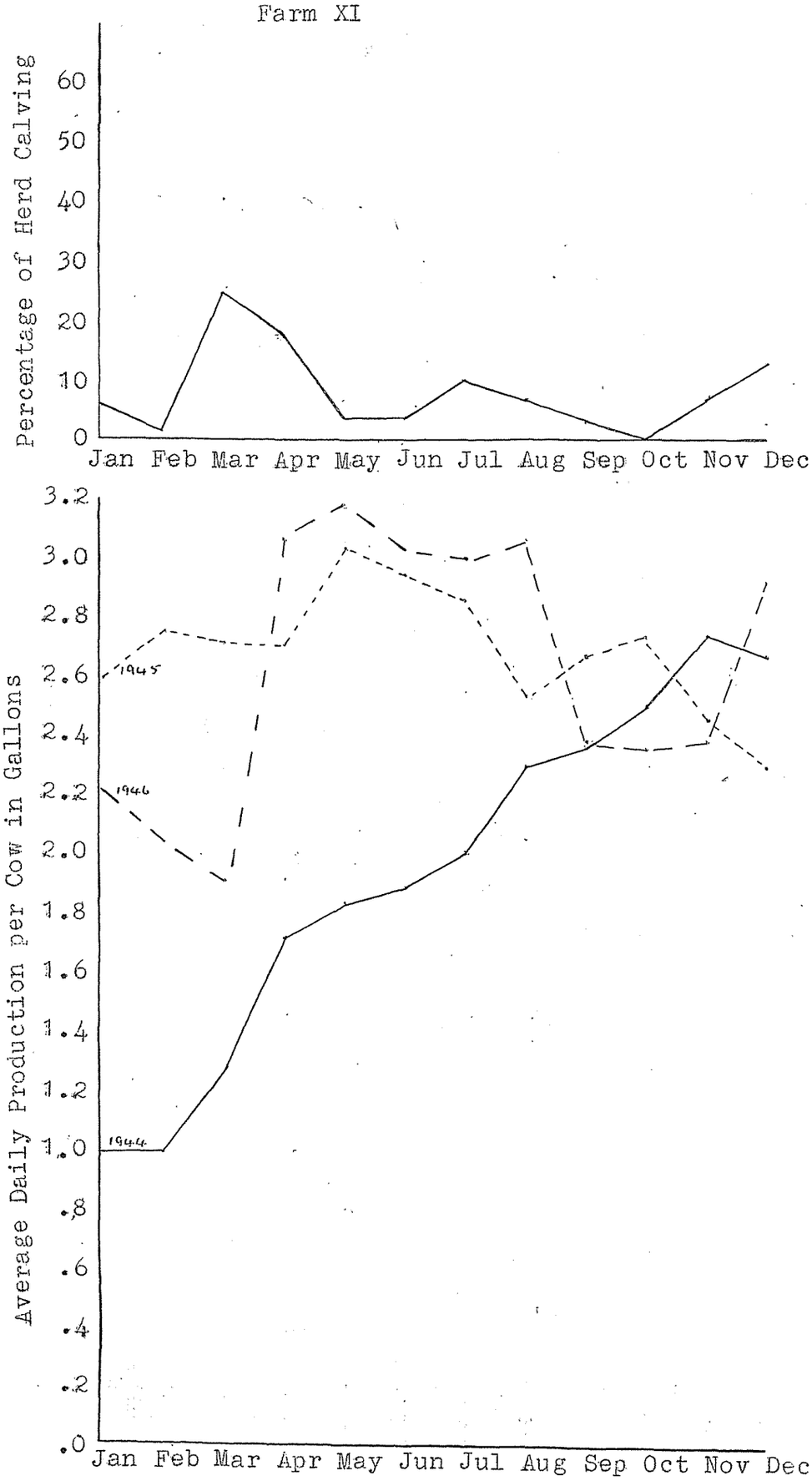
Summer - Early Autumn Period

The increase in the proportion of fresh calvers in the herd is followed by a rise in production per cow. The better season in 1945 did cause a somewhat higher level of production in that year than in the same period of 1944.

Winter and Early Spring Period

Peak production per cow in 1944 came in the autumn but in 1945 and 1946 in the late spring, indicating that feeding over the winter and early spring was not adequate in these years.

Farm XI


Percentage of Herd Calving
60
50
40
30
20
10
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Average Daily Production per Cow in Gallons
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
.0
1945
1946
1944
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Farm XI

This farmer had taken over the farm and herd just prior to 1944. He raised the level of production considerably during that year. Because of change in feeding policy which was accompanied by a change in herd composition during the year, this curve is not considered.

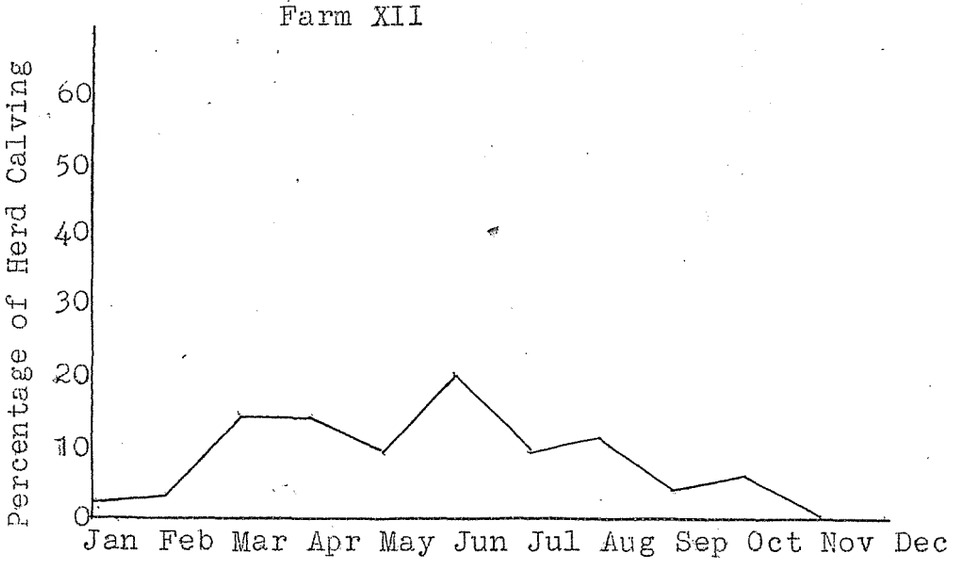
Summer - Early Autumn Period

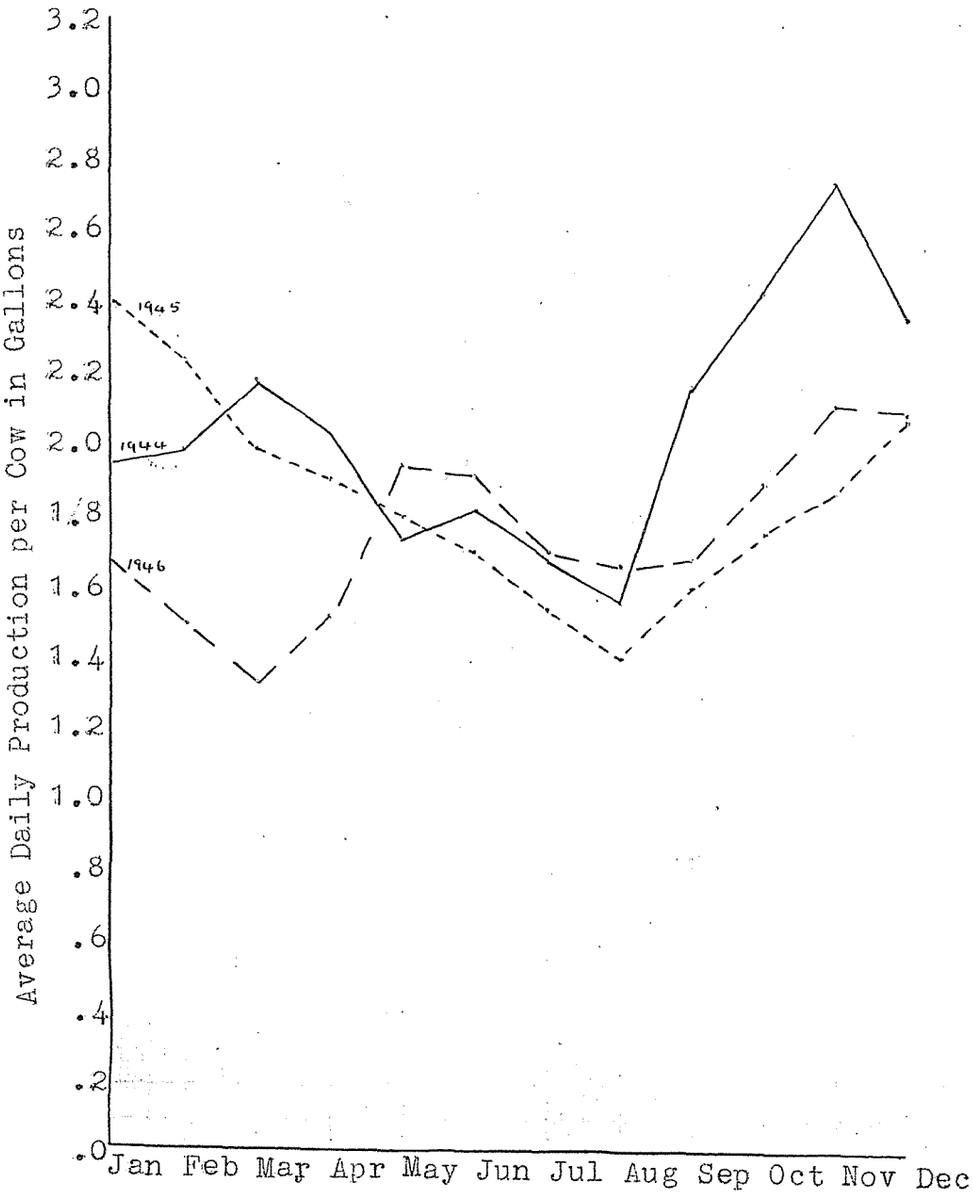
The 1945 curve shows a rise in production following the main calving peak. Production at this time was high showing a good level of feeding.

Winter and Early Spring Period

In contrast to many of the previous farms, the peak in daily per cow production came in May in 1945, close after the main calving peak in March and April. Production declined towards the spring. This indicates that the winter level of feeding was high

Farm XII


Percentage of Herd Calving
60
50
40
30
20
10
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Average Daily Production per Cow in Gallons
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
.0
1945
1944
1946
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Farm XII

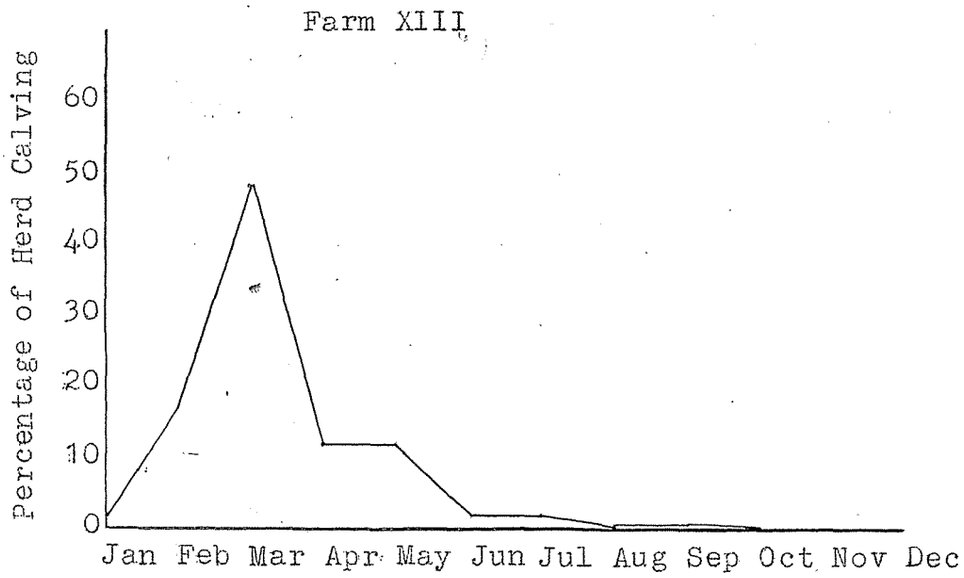
Summer - Early Autumn Period

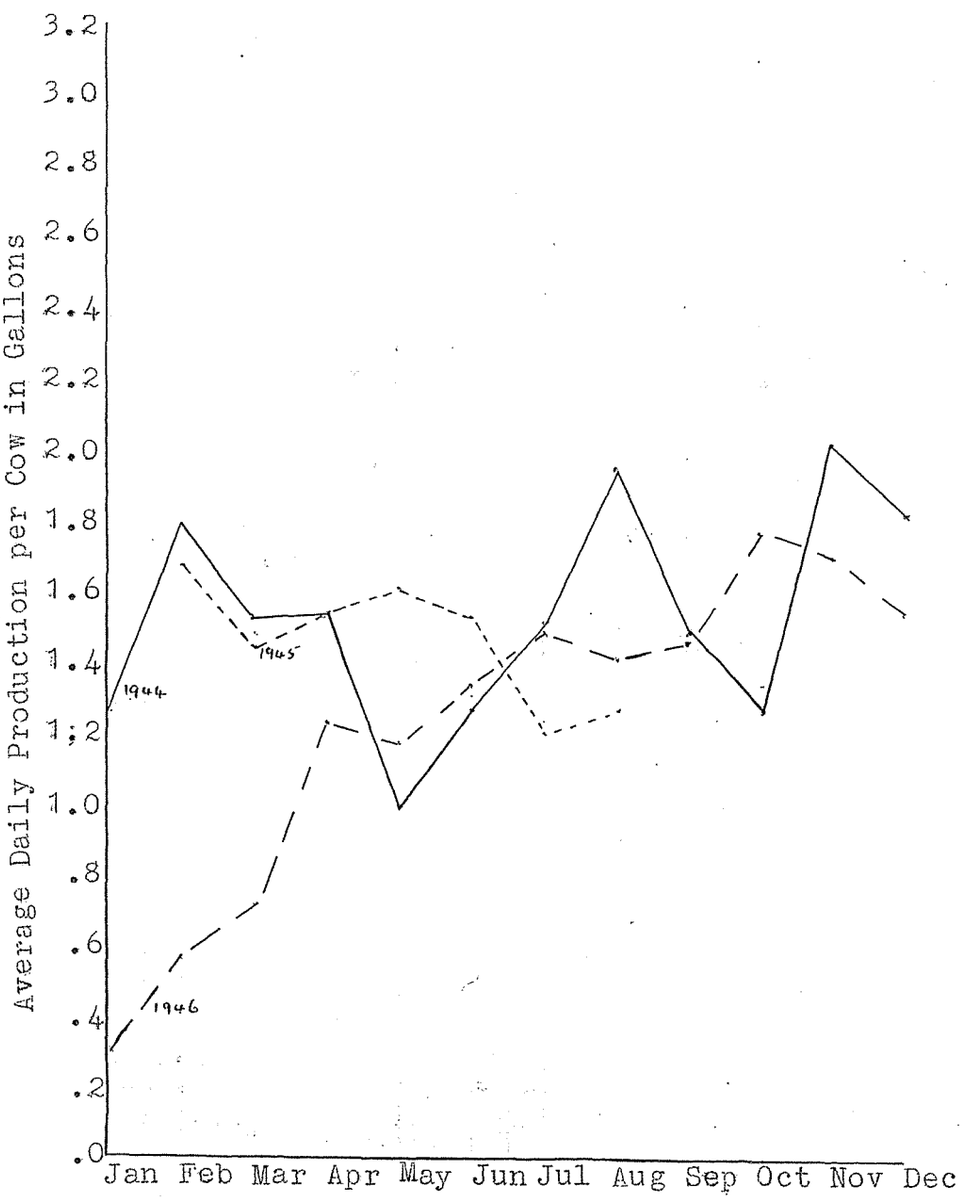
The better season in early 1945 was accompanied by a rise in production over the same period in 1944 but this was not sustained and production fell towards the winter.

Winter and Early Spring Period

Despite an increased number of freshly calved cows in the herd the daily per cow production continued to fall until August in all three years. The peak in daily per cow production was about six months after the highest point of the calving peak. This indicates a poor level of nutrition over the winter and early spring.

Farm XIII


Percentage of Herd Calving
60
50
40
30
20
10
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Average Daily Production per Cow in Gallons
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
.0
1944
1945
1946
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Farm XIII

This farmer lost his brewer's grain contract from October 1945 until April 1946. This had a very marked effect on the production curve.

Summer - Early Autumn Period

During both 1944 and 1945 the autumn production appears to have been almost level with spring production of 1945 and 1946. The information which was available indicates that the better summer and autumn of 1945 did not increase production over the same period of 1944. The marked calving peak in March caused no response in the per cow production curve, but it is probable that feeding was the limiting factor on production at this time.

Winter and Early Spring Period=

The production curve for 1944 is erratic. However peak per cow production appears to have been about October and November in 1944 and 1946. This is about seven months after the very marked calving peak in March, indicating a long period of poor feeding.

Summary of Standard ofFeeding Over the Year

The standard of winter nutrition appears to have been high on the three farms with pedigree herds, 10, 11, and 7 (1946), and on farm 2 in 1944.

The remainder showed a considerable lag between the peak in the rate of calving of the herd in the autumn or winter in most cases, and the peak in average daily per cow production in the spring. This indicates poor winter and early spring feeding.

The level of nutrition on farm 5 in the summer and early autumn in 1944 and 1945 appears to have been high in contrast to others, particularly 1, 3, 6, and 9, when feeding during the dry period was poor.

The effectiveness of the calving plans and the number of cows in milk at any time in spreading production is dependent mainly on the standard of nutrition.

In the preceding graph it can be seen that farmer 6 increased his cow numbers to a maximum during the winter, the calving rate of his herd was greatest in the autumn and winter months, yet the output from his farm was more than 5% below the level production figure for that period.

On the other hand, farm 5 with a level calving system and the same number of cows in milk in each month achieved an output which closely approached level production throughout the year.

Farmers 10 and 11 who calved the bulk of their herds in the autumn and winter achieved a high level of winter production.

It is clear that the effectiveness of some of the autumn and winter calving policies was very much reduced by the plane of nutrition. It seems probable that some farmers such as 6 were attempting to maintain their winter supply by the use of more and more freshly calved cows, rather than by using fewer cows with a good standard of nutrition.

FEEDING METHODS

As on all New Zealand farms, pasture is the main feedstuff. The supplementary feeding necessary to spread production throughout the year depends on the inability, under the prevailing conditions, to spread pasture production sufficiently evenly over the year.

Pasture Management

Type of Pasture

The pasture on these farms was permanent. Although nine of the farmers grew crops, the areas were small and the same land was usually used for more than one year in succession. In no case were pastures frequently and systematically replaced.

Most of the pastures contained perennial ryegrass, paspalum and white clover as dominant species. The sward on farm 11 contained practically no paspalum, while that on farm 2 contained a high proportion of this grass.

The production of a mixed ryegrass and paspalum pasture depends to a large extent on the ability of the manager to control the two species so as to maintain a suitable balance between them. Too much paspalum leads to poor winter and early spring growth, while too little can lead to a greater slump in pasture production during the dry weather than if the balance if better. The maintenance of adequate clover in the sward is also an important factor.

Grazing Systems Used

All the farms except two used rotational grazing systems. These varied from changing the paddock after each milking to changing every 4 - 5 days during the spring months.

The two farmers who departed from a rotational grazing system were 3 and 6.

Farmer 6 changed to cows to a different paddock each day after the morning milking, but used the same night paddock for periods of up to several weeks. He stated that he changed it when he noticed the production of the herd was beginning to fall.

Farmer 3 did not believe in rotational grazing systems

being good for the stock. He considered it better to allow them to wander over a large area at will.

These two farms had the lowest per acre production among the surveyed farms.

Topping and Harrowing

Topping pasture was carried out on these farms when needed. This was very seldom as the rates of stocking were fairly heavy and considerable areas had to be closed for hay and silage, consequently there was little chance of pasture "getting away" in a normal season. The only seasons when topping was necessary were wet summers when paspalum tended to go to seed.

Farmer 1 who made relatively little hay or silage bought in sheep to control pasture in a growthy season.

All the farmers harrowed to spread stock droppings, using light harrows. No heavy harrows were used.

Proportion of Pasture Supplements Conserved as Silage

In a climate such as that experienced in the Auckland district it would be expected that the use of silage instead of hay, by permitting a better growth of aftermath, would cause greater pasture production during the dry period.

The following table shows the proportions of the pasture derivatives conserved as hay and silage, together with the proportions of the supplies produced in the period February to April inclusive in 1944 and for the average of the three periods in 1944, 1945 and 1946.

TABLE 23

| Farm | Percentage as Hay | Silage | Percentage of Supply in Autumn Perid 1944 | Average 1944-45-46 |
|---|---|---|---|---|
| 12 | 100 | 0 | 24.37 | 23.04 |
| 13 | 100 | 0 | 15.34 | 18.91 |
| 3 | 100 | 0 | 14.94 | 16.9 |
| 7 | 100 | 0 | 25.29 | 23.02 |
| 9 | 95.2 | 4.8 | 15.75 | |
| 5 | 80.6 | 19.4 | 24.88 | 23.48 |
| 6 | 79 | 21 | 22.51 | 22.18 |
| 1 | 68 | 32 | 15.86 | 15.73 |
| 11 | 65 | 35 | 16.18 | 19.91 |
| 4 | 62.5 | 37.5 | 22.45 | 20.84 |
| 2 | 57 | 43 | 20.48 | 19.78 |
| 10 | 51 | 49 | 22.36 | 22.31 |
| 8 | 0 | 100 | 25.91 | |

1944 was a season with a dry summer period, which was not as severe as the drought of early 1946.

A greater proportion of hay was used than silage on all but one farm. Farmer 8 on a light soil type (page 22 ) used no hay.

No relationship between the proportion of pasture derivatives used as hay or silage and production in the subsequent dry period is indicated by this table. Any such relationship would be obscured by other factors such as soil type, purchased feeds used, cropping, calving of cows.

Time of Application of Phosphatic Fertilizers

Some of the farmers applied all their phosphatic topdressing in the autumn. Others used some in the autumn and some in the spring. The spring dressings were usually on hay and silage paddocks before closing in order to encourage better aftermath.

The following table shows the average proportions of production in February, March and April for the three years on these farms which used spring phosphate dressings and on those which did not use spring dressings.

Only those farms where purchased feed was not of great importance have been included.

TABLE 20

| Farm | | Average % of Prodn. Feb. March, April |
|---|---|---|
| | Farms using some phosphates in the spring | |
| 4 | | 20.84 |
| 5 | | 23.48 |
| 6 | | 22.28 |
| 7 | | 23.02 |
| 8 | | 25.91 |
| | Farms using no phosphate in the spring | |
| 1 | | 15.73 |
| 2 | | 19.78 |
| 3 | | 16.9 |
| 9 | | 15.75 |

Spring topdressing is not the only factor affecting production over this period, but the table indicates that these farmers who maintained a higher level of production over the dry period used spring dressings of phosphates to assist in providing feed for that time. The applications were usually

made to hay and silage paddocks before closing.

Supplementary Feeding

The usual period of summer and early autumn feeding was January, February and March. Some farms fed out over two months, some over three. On three farms, 2, 3, and 8, little or no supplementary feeding was done in some summer - early autu periods when the dry spell was not severe. During the drought period of late 1945 and early 1946 supplementary feeding continued for about four months, in most cases from January until April.

The most usual period for winter feeding was from the end of May until the beginning of September. This varied a little on some farms. Farmer 6 did not start until July and continued into September. Farmer 2 fed winter supplements from mid May until mid September.

The normal period of winter feeding was about four months. On four farms supplements were fed all the year round. Farmers 12 and 13 used brewer's grains. Farmer 11 fed meal, varying the ration between winter and the rest of the year. Farmer 10 fed supplements in the form of meals all the year until September 1945 when he abandoned the policy, but was forced to resume meal feeding from December 1945 until April 1946 during the drought.

Relative Importance of Different Home Produced Supplements

The following table shows areas of hay, silage, crops, and autumn saved grass used per 100 cows

TABLE 21

| Group | Farm | Area of Supplement in Acres per 100 Cows | | | |
|---|---|---|---|---|---|
| | | Hay | Silage | Crop | Autumn saved grass |
| A | 1 | 30 | 9.4 | - | - |
| | 2 | 42.5 | 31.7 | - | 42.4 |
| | 3 | 42.8 | - | 8.6* | 20 |
| | 4 | 33.3 | 20 | - | ? |
| | 5 | 50 | 12 | 5 | - |
| B | 6 | 35.7 | 9.6 | 4.3 | 25 |
| | 7(1946) | 50 | - | 12 | 40 |
| | 8 | - | 44.4 | - | 22.2 |
| | 9 | 60 | 3 | 11 | 22 |
| C | 10 | 20.8 | 20 | 5 | 16 |
| | 11 | 15.8 | 8.4 | 4.7 | - |
| D | 12 | 14.3 | - | 3.5 | - |
| | 13 | 18.1 | - | 6.6 | 24.2 |

NOTE :- Group A No feed purchased
B Some meal purchased for winter feeding
C Meal fed throughout the year
D Brewer's grains fed throughout the year

* The area shown as crop on farm 3 was 6 acres used for peas for canning. The stock used the haulms as silage.

? Farmer 4 used autumn saved grass but would give no estimate of the area.

Hay

The table shows the importance of hay as a supplement, particularly in groups A and B where meal feeding was leastt important. Farm 8 was an exteption as no hay was used.

Silage

Silage was less important than hay on all except one farm (8). In two cases - farms 10 and 2 - the proportion of silage to hay was, however, high.

The two farms using brewer's grains (Group D) did not use silage because of the wet nature of the grains used.

Crop

Of the five farmers buying no meal, only one, farmer 5, cropped as a direct means of obtaining supplementary feed. The pea silage of farmer 3 was secondary to the main object - cash cropping.

Autumn saved grass

It was possible to find what area of grass was saved in the autumn for use during the winter months. However the value of this as an indication of the grass available over the winter is doubtful. In normal autumns there a flush of pasture growth, some of which carries over into the early winter on all farms whether special areas are saved or not. In addition there is the question of grass growth. Paspalum does not grow during the winter. However, the winters are mild and rye can keep growing to some extent through the winter. Under the circumstances it is impossible to say, for instance, how much of farmer 11's good winter feeding was due to the supplements used, and how much to good winter grass growth. This farmer used no autumn saved grass, but had no paspalum in his pastures. The quantity of grass available may have been

greater and the quality better than on farms where autumn saved grass was used.

Importance of Meal Feeding

Four farmers - numbers 6, 7, 8, and 9 used some meal for winter feeding. This was fed mainly to the cows believed to be the high producers. Quantities used could not be ascertained with any degree of accuracy, but in no case could the amount have been great.

Two farmers, 10 and 11, had fed meals all the year round. Farmer 10 ceased meal feeding in September 1945, commenced again in December 1945, and finally ceased using meals in April 1946. Farmer 11 used meals over the three years In these cases the total quantities of meal used were considerable, especially on farm 11.

Two farmers, 12 and 13, used brewer's grains all the year round. The quantities used were large, especially on farm 12 where a high rate of stocking and high production per acre were maintained. These grains are sold by the "load", not by "weight, and the feeding value varies with the moisture content, type of grain used and the type of liquor being brewed.

Winter and Early Spring Feeding

The thirteen farmers used eleven different supplementary feeding systems over this period.

The following table shows the supplements used on each farm.

TABLE 22

| Farm | Hay | Silage | A/S grass | Meal | Crop |
|---|---|---|---|---|---|
| 1 | " | | | | |
| 2,3,4 | " | "* | " | | |
| 5 | " | | | | Swedes |
| 7 | " | | " | " | |
| 8 | | " | " | " | |
| 6 | " | " | " | " | |
| 9 | " | " | " | " | Chou Mollier |
| 11 | " | " | | " | Chou Mollier |
| 10 | " | " | " | " | Italian ryegrass |
| 12 | " | = | | (Brewer's | Soft turnips |
| 13 | " | - | " | ( grain | Green oats |

* Farmer 3 used silage of pea haulms from a cash crop of peas but no grass silage.

It is evident that there has been very little agreement on the subject of winter feeding. No system had been

found generally satisfactory and adopted by a majority of the farmers.

Crops

The range of crops used shows a similar variation. Two farmers considered that Chou Mollier was the most satisfactory crop. The Italian ryegrass, soft turnips and green oats were used to follow summer forage crops.

Meals

The meals used depended on the supply position. Bran was very popular but hard to obtain. The following meal mixtures were used for winter feeding.

Farm

8 Bran
7 Bran and chaff in equal proportions
6 Bran, crushed oats and dairy ration 3:1:1
9 Dairy ration and whatever grain was available
11 Wheat screenings and copra meal in equal proportions. Peanut meal had been used with wheat screenings, but the above mixture was in use when the survey was made and had been for some time.
10 Peanut meal, oat bran and dairy ration. Details of mixture used and quantities, were not available.
12) Brewer's grain feeding was continued at the same rate
13) as during the remainder of the year.

Except for the popularity of bran, no indication could be obtained as to what meals would be used if supplies were freely available. The type used was influenced by shortage of supply.

NOTE :- The dairy ration referred to was a proprietary mixture, the feeding value of which was unknown. As far as can be ascertained, it was probably similar to linseed meal.

Autumn saved grass

The division between those farmers who used autumn saved grass and those who did not is not well defined. On nine of the farms areas were closed and saved for feeding off at definite periods. In one case (2) the time of utilisation was so early that the practice could hardly be included as the saving of winter supplementary feed.

Areas Conserved : The areas conserved naturally varied with the season. In some years more could be spared in the autumn than in others. Farmers 2 and 13 saved about a quarter of the

areas of their properties, farmers 3, 6, 7, 8, and 9 about one-sixth or one-seventh of their properties, and farmer 10 about one-tenth. Farmer 4 saved "as much as possible" and would make no definite estimate of area.

When closed : One farmer (2) closed his "autumn" grass paddocks in February, two farmers, 8, and 9, in March, and the remaining six, (, 3, 4, 6, 7, 10 and 13) in April and May.

When used : Farmer 2 used his autumn saved grass in April and May. Five farmers (4, 7, 8, 9, and 10) used it in May and June. Farmer 3 used his in June and July, and farmers 6 and 13 in July and August.

Method of feeding : One farmer (9) used an electric fence and fed the saved grass off in breaks. The remaining 8 used a time system, usually allowing the cows about one hour per day on the grass. Farmer 13 allowed then half an hour at first and increased the time as the grass was consumed.

Summer and Early Autumn Feeding

Supplements Used

Farmers 10 and 11 continued to feed meal and Farmers 12 and 13 brewer's grains.

Three farmers (2, 3, and 8) did little or no supplementary feeding during the summer and early autumn unless the dry period was exceptionally severe.

Two farmers (1 and 4 ) used silage.

Two farmers ( 7 and 12) used crops

Five farmers (5, 6, 9, 10 and 11) used both silage and crops.

Soft turnips were the most popular crop, being used by six farmers at some time during the surveyed period.

Maize was used by three farmers.

Chou Mollier was used by two farmers.

Western Wolths ryegrass by one farmer.

The farmers did not always use the same crop every year. Farmer 6 used soft turnips, chou mollier, and Western Wolths ryegrass in different years. On the other hand, farmers

5 and 7 always used both maize and soft turnips.

Drought Period

During the drought period late 1945 and early 1946, the farmers used whatever feed could be obtained. Hay was used alone and soaked in molasses. Farmer 9 purchased cabbage and carrots as waste from a vegetable mart.

Winter and Early Spring Supplementary Feeding in Relation to Spread of Production

Farms 1, 5, and 2 (1945 and 1946) were among those on which the standard of winter feeding was inadequate, although on farm 5 the production was close to the level production figure.

Farmer 1 calved the bulk of his herd in the late winter and early spring. His winter supplementary ration consisted only of hay, and not a great area of that was saved (page 60). There is no reason to believe that this hay was better than average in quality. As a ration for milking cows it would be deficient in quality and probably also in quantity.

Farmer 5 calved his herd evenly throughout the year hence it would contain cows in all stages of lactation. The quantity of hay saved per cow was considerably greater than on farm 1 (page 60) and in addition swedes were used. Such a supplementary ration with some grass available may have been adequate for the lower producers in the herd but cows capable of high production would probably have been handicapped by the bulky nature of the feed.

Hay made up the greater part of the supplementary ration on these farms. The effect of feeding less hay was seen on farm 2.

Farmer 2 fed sufficient hay to satisfy the appetites of his cows after the ration of grass and silage was consumed. In 1944 there were fewer milkers to share the hay and silage hence each had more grass and silage and less hay. The production per cow in that winter was considerably higher than in the subsequent winters when there were more cows in milk

Farms 11, 10 and 7 (1946) showed a better standard

of winter feeding.

On these farms the ration of home produced supplements was the same for all milkers, but in addition a meal ration was fed, the higher producers receiving a greater share than the lower producers.

Farmer 11 used a meal consisting of equal proportions of copra meal and wheat screenings. The higher producers received up to 10 lbs. per day and the average ration for the whole herd was 7 lbs. per day. Four and a half acres of chou mollier were used for winter feeding.

A feature of the supplementary feeding on this farm was the limited use made of hay. The quantity fed was usually about 4 lbs per head per day during the winter, with a maximum of about 10 lbs. per head per day. This was fed as necessary to satisfy the appetite of the cows after the other supplements had been used. The use of a high quality meal ration with chou mollier, grass and limited quantities of hay enabled the higher producers to achieve a level of production which could not have been possible on the hay and swedes used on farm 5, or the hay of farm 1.

Farmer 10 used peanut meal, oat bran and dairy ration There was not sufficient information available to detail the proportions of each, or the average ration for the herd. However the higher producers received 6 to 8 lbs. per day. Italian rye and silage were used and the quantity of hay saved could not have provided a large part of the ration.

Farmer 7 used a mixture of bran and oat sheaf chaff. Approximately fifteen pounds per day was fed to the higher producers in the herd. This meal was not of as good quality as that used by farmer 11, but was better than the hay used by many of the other farmers.

It appears that some of the poor winter nutrition was due to the excessive use of poor quality feeds, i.e. hay, for milking stock. Hay and swedes would not make a suitable ration for high producing stock unless fed in small quantities

with a considerable quantity of grass available.

Summer and Early Autumn Supplementary Feeding in Relation to Spread of Production

Farmer 5 managed to provide a high standard of nutrition for his herd over normal dry periods. This was shown by the small increase in the average daily per cow production in early 1945 when pasture growth was good over that of the same period of 1944. The areas used for crops were 2½ acres for soft turnips and 2½ acres for maize, planted at different times to ensure that the last material fed would not be overmature. In addition 12 acres of silage was used.

This indicates that the normal home produced supplements can maintain a fairly high level of production with the grass available over the normal dry period. It seems that poor feeding at this time was due to lack of quantity of supplements rather than the quality of the supplements used. This does not mean, however, that the supplements used were necessarily the most suitable for the purpose.

Purchase of Feedstuffs in Relation to Spread of Production

In the following table the farms have been divided into groups according to their feed purchase policy.

Group A No feed purchased
B Small quantities of meal
C Large quantites of meal
D Brewer's grains

The relationship between the production of each farm and level production has been indicated as follows:-

Farms with production within ±5% of level production L
Farms above this range A
Farms below this range B

TABLE 23

| Group | Farm | Autumn | Winter | Spring |
|---|---|---|---|---|
| A | 1 | B | L | A |
| | 2 | B | B | A |
| | 3 | B | L | A |
| | 4 | B | L | L |
| | 5 | L | L | L |
| B | 6 | B | B | A |
| | 7 | B | L | L |
| | 8 | A | B | L |
| | 9 | B | A | A |
| C | 10 | B | A | L |
| | 11 | B | A | L |
| D | 12 | B | B | A |
| | 13 | B | L | A |

Although it would be expected that by purchase of meals and their use during periods of pasture shortage, level production would be more easily attainable, the above table shows that this has not happened on these farms.

The only farm with level production was 5, indicating that level production does not require purchased feedstuffs.

The two farmers who used most purchased meal, 10 and 11, maintained a high level of winter production but allowed the autumn production to fall.

Since the supply of brewer's grains is steady through out the year and they cannot be stored for more than a few days under farm conditions, the use of this feed does not assist greatly in maintaining level production. The brewer's grains provide a proportion of the feed which does not fluctuate with weather conditions, hence gives some stability to the feed supply, but the quantity used cannot be adjusted to the fluctuations in pasture growth. The supply of brewer's grains is subject to fluctuations with industrial troubles and may cease completely for a time.

RATE OF STOCKING

The following table shows the rate of stocking on these farms in terms of cows per 100 acres.

For the purppse of this table, bulls and young stock carried have been converted to cow equivalents on the following basis. A bull has been considered as equivalent to a cow, a young animal in its first year to one third of a cow, and in its second year to two thirds of a cow. These proportions are only approximations, but the exact relationship for any farm would be very hard to ascertain. By the use of these figures a better picture of the rates of stocking is given than if dry stock were ignored.

TABLE 24

| Group | Farm | Cows per 100 ac. | Bulls and young stock per 100 acres in cow equivalents | Total |
|---|---|---|---|---|
| A | 1 | 82.3 | 1944 2.5<br>1945 5.0<br>1946 8.4 | 87.6(av.) |
| | 2 | 56 | 6.3 | 62.3 |
| | 3 | 72 | 1944 3.1<br>1945 5.1<br>1946 4.1 | 76.1(av.) |
| | 4 | 70 | 1.9 | 71.9 |
| | 5 | 66.3 | 2.0 | 68.3 |
| B | 6 | 72.2<br>1944 59.7 | 8.2 | 80.4 |
| | 7 | 1945 42.4<br>1946 34.3 | 10.3 | 52.8(av.) |
| | 8 | 72 | 2 | 74 |
| | 9 | 61.9 | 1944 6.4<br>1945 6.8<br>1946 4.3 | 67.7(av.) |
| C | 10 | 61.4 | 10.7 | 72.1 |
| | 11 | 83 | 13 | 96 |
| D | 12 | 1944 134,3<br>1945/6 104 | 4<br>2.9 | 122.6(av.) |
| | 13 | 112.5 | 3.7 | 116.2 |

The cow numbers used were the farmer's estimates of the maximum size of their herds. Breed used will affect the rate of stocking. A herd of heavy Friesians will have greater feed requirements, greater productive potentiality and do greater damage to pasture by pugging than an equal number of Jerseys.

The rate of stocking is likely to affect the spread of production particularly in the winter. Heavy stocking at that time particularly on heavy soil will cause pugging and lower winter and early spring production.

Farmer 12 had a heavy rate of stocking which was maintained by the use of brewer's grains. In 1944 he used only 26 acres of land. In the next two years he used 35 acres. In 1944 he produced 25.75% of his supply in the winter months. In the subsequent years he produced 29.39% and 32.03% of his supply in the winter. Although it is not possible to ascribe any of this increase definitely to less pasture damage, it is probable that it was responsible for at least a portion of the rise.

Maintenance of level production is probably made easier by use of a runoff, particularly on farms with a heavy

rate of stocking due to meal feeding. Farmers 10 and 11 both fed meals to milking stock and both used runoffs for dry stock. The runoffs enabled them to remove dry stock from the milking area in the winter or summer dry periods, thus leaving maximum feed for the milkers and at the same time minimising pasture damage during the winter.

A further effect of rate of stocking on spread of production is that overstocking will limit the quantity of hay and silage which can be saved, unless the herd is deliberately starved during the spring flush period. This will, unless feeds are purchased in sufficient quantities, tend to lower production during the periods of poor pasture growth.

LABOUR

Since level production entails greater use of supplementary feed than seasonal production, the labour requirement on farms producing a level supply will be greater than on those where production is more seasonal. The extra labour for harvesting, cropping and feeding may be obtained by employment of casual, contract, or permanent labour, or by the farm staff working harder than they would under conditions of seasonal production. Where the cost of labour either in money or in work is high, or the labour is difficult to obtain, it may be difficult to carry out sufficient supplementary feeding to maintain level production. Consequently the cost and availability of labour affects the spread of production

Permanent Labour

The following table shows the number of permanent labour units on each farm together with the size of the herd.

TABLE 25

| Farm | Permanent labour units | Size of herd |
|---|---|---|
| 1 | 1 | 65 |
| 2 | 1 | 47 |
| 3 | 1 | 70 |
| 12 | 1 | 35 |
| 4 | 2 | 75 |
| 8 | 2 | 36 |
| 11 | 2 | 95 |
| 13 | 2 | 82 |
| 5 | 3 | 100 |
| 6 | 3 | 140 |
| 7* | 3 | 80 in 1944<br>50 in 1946 |
| 9 | 3 | 100 |
| 10 | 4 | 120 |

* The herd on farm 7 was reduced from 80 to 50 in mid 1945.

All the labour was male - no females were employed. Two factors made the estimation of the labour force on each farm difficult. Several owners lived on their farms and worked on them for a portion of the time. They managed their farms, but had other interests which kept them away at times. In the sense that they had no other definite occupations they were full labour units on their farms, but if the amount of time spent working on their farms was considered, they were not.

In no case was family labour normally used for milking, and farmers stated that they received no family assistance in working their farms. This has been taken as being correct, but it is very probable that some assistance from this source was used at times. A little assistance from members of the family at certain periods, together with the employment of non-permanent labour might have made the employment of an additional permanent man unnecessary on some of the farms.

Payment of Permanent Labour

Wages

The following wages were paid.

Manager : (Farm 11) £6.0.0 per week with a house, In additio an annual bonus varying with the annual production was paid. This was £50 in 1944, £75 in 1945 and £120 in 1946.

Married Men : These men were the "semi managers" employed on farms 4, 8, 9, and 10.

Farmers 4 and 8 paid £6.10.0 per week with free house.

Farmer 9 £6.8.6 per week with free house

Farmer 10 £7.10.0 + £50 bonus per year with a free house

Single Adult Men ;

Farmers 4, 6, and 10 paid £5.5.0 per week

Farmer 9 £6.0.0 per week

Youths :

Farmer 13 paid £3.0.0 clear to a boy of 17.

Farmer 11 paid award wages plus 5/- or 10/- a week depending on the age of the boy.

Farmer 10 owned a pedigree herd and the higher wages for his married employee would cover extra work and responsibility with the stock.

Where houses were available married men were preferred as employees since they were considered to be more responsible and more stable.

Farm 7 wages have not been included since some cropping was done and the wages did not apply to dairy farm work alone.

Conditions of work

Holidays

The weekly and yearly holidays for employees varied considerably with the arrangements made on different farms.

In all cases except three, the weekly holiday was Sunday plus one other day between milkings.

On farm 6 the weekly holiday was Sunday between milkings plus one other day clear.

On farm 9 Sunday between milkings plus one other day including the evening milking free.

On farm 10 the married man had Sunday between milkings and one clear day per fortnight free, and the single men Sunday plus one other day between milkings.

In all cases except one the yearly holiday was 14 days. The married man on farm 10 had 28 days.

The holidays for the owners varied considerably, the

owners who employed no labour getting very few annual holidays.

Daily Hours of Work

Estimates of the typical daily hours of work appeared to be unreliable in several instances. With the considerable variation in work requiring to be done at different periods of the year, the hours work varied, and it was understandable that definite information on this point would be difficult to obtain.

The following are two examples of farmer's estimates

A farm where no labour was employed.

Milking 5 a.m. to 8.30 a.m.
Farm Work 9 a.m. to 12.30 p.m., 1.30 to 3.30 p.m.
Milking and General 3.30 p.m. to 6.45 p.m.

A total of 12 hours 15 minutes.

Since this farmer milked up to 65 cows on his own he would have little spare time, but whether he maintained these hours of work continuously is not certain.

A farm where labour was employed.

Milking 5 a.m. to 8.30 a.m.
Farm Work 9 a.m. to 12 a.m.
Milking 2.30 p.m. to 5.30 p.m.

Total 9 hours 30 minutes

As far as could be ascertained this system, where normally no work was done between the midday meal and the afternoon milking, was common on these farms where labour was employed. This was, of course, conditional on no harvesting or other urgent work being necessary.

Non Permanent Labour

Casual Labour

Five of the farmers employed casual labour to assist with routine farm work such as hedge cutting and drain clearing. It would have been difficult for farmers 1 and 3 who milked up to 65 cows without assistance to have dispensed with casual labour for this work. On farm 6 there was a considerable amount of drain clearing to be done. The casual worker on farm 11 had been employed largely on repair and maintainance work and the amount of casual labour employed on this farm would be lower in

subsequent years since building repairs would not need to be done again for a considerable period.

Casual labour was very important during the harvesting season. Six of the twelve farmers who made hay employed casual labourers either alone or in addition to contract balers.

Only three of the ten farmers who made silage employed casual labour since those with a larger labour force could handle silage without assistance.

The normal rate of payment varied from 3/- to 3/6 per hour.

Contract Labour

In two cases contract labour was employed for both hay and silage making. Three other farmers employed contract balers but supplied the remainder of the labour with their own and neighbours employees and in some cases, casual labour.

Three of the farmers who grew crops employed contractors to do the work.

The main factor in determining whether casual or contract labour was employed was that of machinery. Farmer 6 had his hay, silage and crop work done by contract even though he owned sufficient machinery (except for a hay baler) to do the work himself. In all other cases contractors were employed because machinery not available on the farm was required.

Cooperation Between Farmers

Four farmers had arrangements for working with other farmers at harvesting time. In two of these cases the arrangements were between brothers and machinery was involved.

In the other two instances the groups were small and extra labour was required for haymaking, although none was required for silage making.

At one time group harvesting systems including cooperation between farmers were more common but most of them broke down. Inequality of work on different farms and particularly the question of silage making caused trouble. Silage making involved starting the harvesting season early, and the farmers

in the groups who did not make silage were unwilling to continu The inequality of work was sometimes balanced by payment of wages, but whatever scheme was used the harvesting season became long and drawn-out if the gang was made up of the labour from a number of farms.

Most of the farmers preferred to be independent so that they dould commence their harvesting when they wished to and get it finished quickly.

Out-put per Labour Unit

In order to obtain a more accurate estimate of the out-put per labour unit than would be given by considering only permanent labour, casual and contract labour have been included as permanent labour equivalents in the following table.

The bases used forconversion of non-permanent labour to permanent labour were as follows.

Harvesting

A 7 man gang doing $\frac{1}{2}$ an acre of silage
or $\frac{3}{4}$ an acre of hay in 5 hours

Cropping

Working up land and sowing crop 5 man hours per acre
Resowing to grass 4 man hours per acre

It was assumed that one full time labour unit averages 63 hours work per week and works 50 weeks per year. (This was used by the Labour Department in calculating the Under Rate Wages Scale).

The following table shows the labour used as full time labour equivalents and the out-put per full time labour unit in gallons per year (average for the three years, 1944, 1945 and 1946)

TABLE 26

| Farm | Permanent labour | Routine work | Cropping | Silage | Hay | Total | Gals/LU/year |
|---|---|---|---|---|---|---|---|
| 1 | 1 | .127 | | .016 | .023 | 1.166 | 29,605 |
| 3 | 1 | .016 | | | .055 | 1.071 | 25,654 |
| 2 | 1 | | | .041 | .036 | 1.077 | 24,846 |
| 11 | 2 | .5 | | .017 | .022 | 2.539 | 21,453 |
| 12 | 1 | | | | .017 | 1.017 | 19,918 |
| 4 | 2 | | | .034 | .038 | 2.072 | 19,507 |
| 9 | 3 | | | .034 | .073 | 3.107 | 18,575 |
| 10 | 4 | .036 | | .033 | .023 | 4.092 | 18,557 |
| 5 | 3 | | | .022 | .06 | 3.082 | 17,494 |
| 13 | 2 | | | | .023 | 2,023 | 17,219 |
| 7 | 3 | | | | .03 | 3.03 | 14,940 |
| 6 | 3 | .436 | .013 | .038 | .106 | 3.593 | 14,274 |
| 8 | 2 | | | .036 | | 2.036 | 11,998 |

NOTE : It should be remembered that these figures are affected by the number of young stock reared on each farm. Consequently they do not show the total out-put per labour unit at the pail. In addition to this they are affected by the breeds used, i.e. the milk is of different tests in each case.

The figures are higher in all cases than the 10,000 gallons per year considered by the Milk Commission (1943) to be a reasonable out-put per labour unit.

Some of them, particularly the first three in the above table, probably give a false impression. In this district it is common for a young farmer to work for maximum returns with minimum expenditure for a number of years, until he has sufficient equity in his farm to be able to obtain an adequate income with the farm run by a sharemilker or manager and additional labour.

The out-put per labour unit for these three farms probably represents the out-put attainable by a man working as hard as possible for a period of perhaps twelve or fifteen years, not an out-put to be sustained for the working lifetime of the farmer.

The figures for those farms where permanent labour was employed probably give a better picture of out-put per labour unit where the labour was working under more normal conditions. Even on these farms the out-put per labour unit was considerably above 10,000 gallons per year.

Relationship Between Out-Put per Labour unit and Spread of Production.

It is to be expected that on those farms where the production was greater in the autumn and winter periods, the greater amount of supplementary feeding necessary would necessitate more labour than on farms where the production was more seasonal; hence the out-put per labour unit would tend to be lower. The following table shows the production per labour unit on these farms together with the average proportion of the production in the spring and summer period (September to January inclusive).

TABLE 27

| Farm | Production per Labour Unit | Proportion of Spring Prodn. |
|---|---|---|
| 1 | 29,605 gallons | 52.3% |
| 3 | 25,654 " | 49.38% |
| 2 | 24,846 " | 48.92% |
| 11 | 21,453 " | 44,71% |
| 12 | 19,918 " | 47.03% |
| 4 | 19,507 " | 45.21% |
| 9 | 18,575 " (1944 only) | 47.28% |
| 10 | 18,557 " | 41.7 % |
| 5 | 17,494 " | 44.36% |
| 13 | 17,219 " | 45.11% |
| 7 | 14,940 " | 44.18% |
| 6 | 14,274 " | 46.82% |
| 8 | 11,998 " (1944 only) | 43.5 % |

The three farms with the greatest production per labour unit (1, 2, and 3) were all "one man farms". These three farmers produced a greater proportion of their milk when less supplementary feeding was needed than the remainder of the farmers.

This gives some indication that the labour available may affect the spread of production. Had these farmers spread their production more evenly over the year, more supplementary feeding would have been required, and more labour would probably have had to be employed.

SUMMARY

A number of factors affecting the spread of production have been discussed.

These are

the non-enforcement of contracts

the proportions of the herd in milk at different periods

the calving dates of the cows in the herd

the standard of feeding over the year

rate of stocking

labour considerations

differential prices paid for town milk at different periods.

These factors cannot well be considered separately, since they affect one another as well as the production at any particular period. Addition of freshly calved cows to a herd may increase production, but if the feed supply is limited, there may be a smaller proportion available for productive purposes after the maintenance requirements of the herd have been met, and production of the herd will fall.

Purchase of feedstuffs may make high winter production easier to attain, but a higher rate of stocking possible with purchase of feedstuffs may depress the feed supply by causing more damage to pasture during the winter months than if fewer animals were run.

It seems that the main factor affecting the spread of production was the feed supply. The policies with regard to numbers of cows in milk and ~~to a maximum extent~~, the calving of the cows, depend for their effectiveness on the standard of feedin

Rate of stocking may have been a factor in limiting food supplies at some periods of the year. A high rate of stocking may not only cause damage to pasture during the winter and early spring but also make it impossible to save sufficient home produced feedstuffs for the dry period and winter feeding.

The availability of labour may have limited the amoung of supplementary feeding possible. The fact that contracts were not enforced enabled farmers to spread their production in a way which would not have been possible had they been forced to fulfil them. The differential prices paid in different periods of the year were designed to encourage level production, but the high winter price may have encouraged some farmers to try to produce more milk at this period than called for by their contracts.

## PRODUCTION PER ACRE

The production per acre on the farms for the three years covered by the survey was as follows (These figures represent milk delivered to the treating house, not at the pail)

TABLE 28

| Group | Farm | Production per Acre in Gallons 1944 | 1945 | 1946 | Average |
|---|---|---|---|---|---|
| A | 1 | 437 | 465 | 404 | 435 |
| | 2 | 339 | 333 | 283 | 318 |
| | 3 | 258 | 310 | 282 | 283 |
| | 4 | 365 | 294 | 393 | 384 |
| | 5 | 395 | 365 | 311 | 324 |
| B | 6 | 301 | 260 | 219 | 260 |
| | 7 | 342 | 310 | 278 | 310 |
| | 8 | 489 | | | 489 |
| | 9 | 356 | | | 356 |
| C | 10 | 342 | 435 | 385 | 387 |
| | 11 | 357 | 530 | 544 | 477 |
| D | 12 | 784 | 601 | 653 | 646 |
| | 13 | 511 | 461 | 459 | 477 |

NOTE : It is unlikely that a considerable proportion of the milk was below the minimum test allowed.

Groups

The farms have been divided into groups according to their feed purchase policies.

Farmers in group A purchased no feed.

Those in group B purchased small quantities of meal for winter feeding.

Group C farmers purchased large quantities of meal. Farmer 10 used meal all the year round in 1944 and 1945 except for the short period September to November inclusive. In 1946 meals were not used after April. Farmer 11 used meal all the year round throughout the three years.

Group D farmers used brewers' grains all the year round

Production figures for farms 8 and 9 were available for one year only. In the case of farm 8, the figures for subsequent years were bulked with those for another farm owned by the same farmer. Two herds were milked in farmer 9's shed from early in 1945 onwards and the out-put of both herds was given as one figure in the farmer's returns.

The severe drought conditions in early 1946 caused a

considerable drop in production in that year on most farms. Farmer 11 managed to increase his out-put despite the drought and farmers 4 and 13 kept their out-puts at about the same level as in the previous year.

## Factors Affecting Per Acre Production

### BREED USED

The following are farmer's estimates of herd compositions in early 1947. Because of the large replacement rates these herds may have changed in breed composition over the period covered by the survey. In addition many of the animals were grades and crossbreds. An animal described as a Jersey may have been far from the breed average in test.

| Farm | Herd Composition |
|---|---|
| 2 | 25% of each - Jerseys, Ayrshires, Shorthorns, Friesians |
| 3 | 60% Jerseys, 30% Shorthorn, 10% Friesian |
| 5 | 45% Friesian, 45% Shorthorn, 10% Jersey |
| 6 | 50% Shorthorn, 25% Jersey, 25% Friesian |
| 8 | 40% Friesian, 30% Jersey, 27% Shorthorn, 3% Ayrshire |
| 9 | 65% Friesian, 20% Jersey, 15% Shorthorn |
| 12 | 50% Shorthorn, 50% Jersey - Shorthorn cross |
| 1 | Mainly Jerseys. A few Jersey X Shorthorns |
| 13 | Mainly Shorthorns. Some Jerseys and Friesians |
| 7,10 &11 | Friesians. Mainly pedigree animals. |

This gives some indication of the probable test of the milk supplied by these herds but because of the mixture both within herds and within cows it is of limited value.

More specific information was available for some farms

TABLE 29

| Farm | Year | Per acre Production in lbs. butterfat |
|---|---|---|
| 1 | 1945 | 213 |
| | 1946 | 189 |
| 5 | Yr.ending May 1946 | 117 |
| 12 | 1944 | 312 |
| | 1945 | 252 |
| | 1946 | 229 |
| 7 | 1946 | 105 |
| 11 | 1943/4 | 121 |
| | 1944/5 | 177 |
| | 1945/6 | 209 |

Tests carried out by the Metropolitan Milk Board inspectors at irregular intervals give an indication of those herds with low testing milk. These tests were not spread evenly over the year, hence they do not give a true picture of the test

of each herd, but the lower testing herds can be safely considered as those with butterfat tests most frequently below 3.5% and solids not fat below 8.5%

TABLE 30

| Herd | Morning Milk | | | Evening Milk | | |
|---|---|---|---|---|---|---|
| | Times sampled | Times below 3.5%b.f. | Times below 8.5% s.n.f. | Times sampled | Times below 3.5%b.f. | Times below 8.5% s.n.f. |
| 1 | 1 | 0 | 0 | 20 | 0 | 1 |
| 2 | 5 | 2 | 1 | 18 | 0 | 4 |
| 3 | 2 | 0 | 0 | 19 | 0 | 1 |
| 4 | 14 | 2 | 6 | 10 | 0 | 1 |
| 5 | 8 | 0 | 2 | 23 | 6 | 0 |
| 6 | 16 | 1 | 5 | 11 | 0 | 0 |
| 7 | 6 | 1 | 1 | 25 | 0 | 4 |
| 8 | 15 | 3 | 3 | 23 | 0 | 4 |
| 9 | 11 | 4 | 2 | 31 | 0 | 2 |
| 10 | 17 | 12 | 11 | 11 | 0 | 3 |
| 11 | 17 | 7 | 9 | 12 | 0 | 3 |
| 12 | 0 | 0 | 0 | 4 | 0 | 1 |
| 13 | 9 | 0 | 1 | 21 | 1 | 2 |

The low test of the milk given by two Friesian herds (7, 10, and 11) is apparent. On a gallonage basis the production per acre of herd 1 appears to have been considerably below that of herd 11 in 1945 and 1946, yet it is probable that on a butterfat basis there was not much difference between them.

With payment on a gallonage basis as it was on these farms there was no point in producing high test milk. All that was required was to use a herd either ~~pure~~ of one breed (if suitable animals could be found) or of mixed breeds to ensure that the test did not fall below the minimum allowed percentage. It is possible that it may have paid to increase out-put per acre in gallons still further by using low testing animals and accept the penalties inflicted when the test of the supply fell below 3.5%.

The minimum test prescribed by the Metropolitan Milk Council was 3.5%. This was enforced by penalties. In some cases companies charged 1/10th of a penny per gallon for each 0.1% fat test below 3.5%. Other companies reduced the volume of milk credited to the supplier, while holding the fat content constant until the test was raised to 3.5%. In another case the company applied no penalty as long as the test of the bulk milk was 4.3% or above. If it fell below this suppliers of low test milk were penalised.

PRODUCTION PER COW

Most of the farmers sold a considerable number of cows each year as they dried off or if they were producing at a low level and bought in fresh replacements. Consequently the number of animals from which the yearly production was derived was greater than the estimates given by the farmers of the maximum number of cows in their herds at any time during the year. It is not possible to determine all the whole and partical lactations involved in the year's production from the data available

Presumably the average figure found by Connell (Milk Commission Report 1944) of 507 gallons per cow was based on the maximum number of cows in each herd during the year. For purposes of comparison the figures for these farms on the same basis are given. It should be remembered that they are subject to the following errors.

(a) The cow numbers on which they are based are not exact.

(b) Additional portions of lactations are involved hence the time average per cow production figures will probably be below those shown.

(c) No correction has been made for milk fed to young stock. In these cases this quantity would be small on a per cow basis.

TABLE 31

| Herd | Production per cow in gallons 1944 | 1945 | 1946 | Average |
|---|---|---|---|---|
| 1 | 531 | 565 | 497 | 531 |
| 2 | 606 | 596 | 506 | 569 |
| 3 | 358 | 430 | 389 | 392 |
| 4 | 508 | 561 | 560 | 543 |
| 5 | 597 | 551 | 470 | 539 |
| 6 | 424 | 366 | 308 | 366 |
| 7 | 625 | 761 | 795 | 727 |
| 8 | 680 | | | 680 |
| 9 | 577 | | | 577 |
| 10 | 559 | 711 | 629 | 633 |
| 11 | 433 | 645 | 659 | 579 |
| 12 | 582 | 601 | 553 | 579 |
| 13 | 454 | 411 | 409 | 425 |

On two of the farms (3 and 6) and perhaps on 13 as well, the average per cow production figures are far below the remainder that they are probably significant.[89]

Breed used has a considerable influence on the figures

If two cows produce an equal quantity of butterfat - 225 lbs., the Friesian with a 3.6% test will produce 607 gallons of milk, and the Jersey with a 5.4% test 404 gallons.

None of these three herds is likely to have had an average test nearly as high as 5.4%, consequently there is an indication that the level of production per cow on these three farms was low. The per acre production of farms 3 and 6 was low, that of farm 13 was influenced by the use of purchased feedstuffs.

Herd test figures were available for farm 11.

For the season ending in May 31st, 1944 for herd test average was 488 gallons 3.74 test 188 lbs. fat

Year ending May 31st 1945 754 " 3.74 " 291 " "

Year ending May 31st 1946 667 " 3.61 " 248 " "

This herd was being changed to a pedigree herd during the 1943/4 testing season. Because of this the figures cannot be regarded as being likely to be typical of the group.

In the case of one pedigree herd, although testing was in practice for most of the herd no figures were given. Figures for the other pedigree herd were available for one year, but did not cover all the herd.

PURCHASE OF FEEDSTUFFS

In Table 28, The farms have been grouped according to the feed purchase policy pursued. So many other factors influence the per acre production figures that the average per acre production figures do not steadily increase with the importance of meal feeding.

However the per acre production figure for farm 12 was very high, both in terms of gallons, pounds of butterfat (Table 29). This was achieved mainly by use of considerable quantities of brewer's grains.

The use of purchased feedstuffs would not only permit greater production per acre because of a heavier rate of stocking per acre as seen on farm 12. Use of high quality purchased meals in the rations of high producing stock in winter, when the use of home produced supplements alone would have limited their

production would raise production in that period and the total production per acre per year.

In addition to the direct effects of the purchased feedstuffs there is some gain from the manurial value of the residues. On most of these farms using purchased feeds this is small. It may have been of importance on farms 12, 13, 11 and 10. However with the higher rate of stocking possible on these farms the increased pasture damage in winter and early spring probably counteracted the beneficial effects of manurial residues to some extent.

SPREAD OF PRODUCTION OVER THE YEAR

The spread of production on these farms has been shown in Table 6.

Dairy farmers supplying milk to cheese factories or cream to creameries adopt a system of seasonal production which permits the maximum use of pasture at its most nutritious stage and the use of supplements is at a minimum. This avoids as far as possible the use of additional labour the the heavy losse involved in conservation of pasture as hay and silage.

Because they must supply milk throughout the year town milk suppliers must transfer large quantities of feed from one period to another. The greater the proportion of milk produced at periods when pasture growth is slow or nil, the greater the losses incurred in conserving of hay and silage.

Use of purchased meals avoids this to some extent. All or the bulk of the purchased feed can be used in periods of pasture shortage, thus reducing the quantity of pasture which must be used as hay or silage. This would help to account for the high production per acre on farm 11 where the percentage of the farm closed for hay and silage was small (Table 21) and the quantity of purchased feed large.

Among those farms where no feed was purchased the high production per acre on farm 1 was probably due in part to the low proportion of milk produced in the summer and winter periods (Table 6) involving less use of hay and silage than on

the other four farms in this group (Table 21).

The increased pasture damage resulting from attempting higher production in the winter on some farms would not only tend to lower production in that period but also production per acre.

PASTURE MANAGEMENT

The per acre production of a farm, particularly if no purchased feedstuffs are used, would, under conditions of town milk supply, probably be increased by any measures to provide a better spread of growth over the year. The more seasonal the pasture growth, the greater the quantities which must be conserved for use in other periods and the greater the losses incurred in conservation over the whole farm.

Grazing rotations will affect the production of a pasture. The best system for use under any specific conditions cannot be laid down. However it is generally accepted that some form of rotation is necessary for maximum pasture production. These systems adopted by farmers 3 and 6 (page 57) would tend to depress per acre production.

One of the disadvantages of town milk production is that it is very difficult to spell paddocks, particularly those closer to the shed. Milking stock must be given as much grass as possible over the winter and feeding of home produced supplements is usually spread over the farm in an attempt to avoid punishing any one area unduly. This was the policy adopted on these farms. Autumn saved grass was, in all except one case, fed off by a time system, not by breaks, hence the paddocks used for this would be subjected to considerable winter trampling. Although most of the farmers stated that pugging was not severe, this probably, particularly on the wetter farms such as 6, and those more heavily stocked such as 12, 13, and 11, had a depressing effect on pasture growth, hence on per acre production.

It is possible that the per acre production of some of the farms was affected by the age of the pastures. Most of them had been down for many years, and had been subjected to

the rigours of town milk production for long periods. Perhaps resowing with better strains would improve per acre production in some cases.

LABOUR

The labour force used is likely to affect per acre production in several ways.

In the carrying out of maintenance work, an adequate labour force can keep a farm in good running order. This may affect per acre production, particularly through such matters as maintainence of drains. Lack of attention to these may lead to increased pugging and later spring growth.

Milking with insufficient labour may mean inefficiency resulting in lowered production. Two of the farmers were milki up to about 65 cows on their own. This can have given them little time to attend to individual cows - to examine udders to see that they milked cleanly and were free from early stages of mastitis unless the time spent in the shed was unduly long. It is possible, of course, for a man to develop an efficient shed routine enabling him to milk a large number of cows without assistance.

Testing stock by a milk recording method would be easier with adequate labour available. There is no need for this methods to be adopted if Group Herd testing is available However rationing of meals according to production would require adequate labour, and for the best use of meals some form of rationing is essential.

One of the chief reasons why silage was not used more widely was because of the labour involved in harvesting and in feeding out. Production per acre might be increased to some extent by increased use of silage, which is partly dependent on the labour available.

The present low concentration of labour on some of the farms permits little or no let up for the owner and employees if there are any. It is reasonable to suppose that more labour available would reduce the drudgery on these farms, resulting in more efficient work and more interest in the

farming which might raise production. It is, of course, impossible for economic reasons to employ extra permanent labour on small farms; the cost would be too great in relation to the possible returns. However, something might be gained by employment of additional labour for short periods if suitable labour could be found, in order to give the permanent labour a break from the routine. It would be possible for an employee to be away on farms such as 10 or 5 where the remainder could do the milking. On farms such as 1, 2, 3, and 12, with only one labour unit, and to some extent those with only two the situation is more difficult and additional labour would be needed.

HERD MAINTENANCE AND IMPROVEMENT

Type of Stock Used

As seen previously (page 80 ), Jerseys, Ayrshires, Shorthorns, Friesians and crosses between these breeds were used.

A cause of this diversity was the common policy of purchase of replacements. Whatever a farmer's personal preferences were, his first concern was to obtain sound animals due to calve when required. This limited his scope for selection between breeds.

Heifers coming on the market were bred almost entirely on seasonal dairy farms, since town suppliers normally retained any they reared for their own use. Older cows available included a large proportion culled from seasonal dairy herds. Consequently herds maintained by purchase of replacements tended to be composed of much the same type of animal as herds on seasonal dairy farms in surrounding districts. This probably helps to account for the presence of Jersey and Jersey cross animals and the relative scarcity of Ayrshires which may have been more widely used if more had been available.

Test considerations influenced the type of stock used. Friesians were popular since milk was sold on a gallonage basis. This factor told against the Jersey, which was,

however, used in some otherwise low testing herds to maintain the test of the supply above the minimum. Shorthorns and Ayrshires had advantages over the Friesian in maintaining test above the minimum, while not tending to be uneconomically high testing like the Jersey. Some farmers preferred to use all low testing animals such as Friesians and to accept any penalties inflicted rather than attempt to raise the average test of the supply.

Another factor considered was the cull value of the stock. Farmer 5, for instance, bought large deep bodied animals partly because he believed them to be usually good milkers and partly because they brought higher prices as culls. This factor tended to made the Shorthorns and Friesians more popular than lighter breeds.

Obviously the lower the test of the supply the higher the production per acre in gallons will tend to be. From the financial aspect, however, the possibility of penalties for low test milk and the value of the animals as culls may merit some attention.

Herd Wastage

Only two farmers had records of annual wastage rates. These were

| | 1943/4 | 1944/5 | 1945/6 |
|---|---|---|---|
| Farm 8 | 33% | 30% | 30% |
| Farm 9 | 32% | 25% | 20% |

The remainder of the farmers gave estimates varying from 10% to 33% per year. The Dairy Board found the annual wastage rate on seasonal dairy farms was about 17 to 18%. These town milk farmers bought most of their replacements and ran the risk of introducing low producers and diseased stock into their herds. In addition their cows were milked over the winter and subjected to more rigorous conditions than cows in seasonal dairy farms. Hence estimates of wastage rates below about 20% must be regarded with suspicion and those of 10% as improbable for one year and impossible for a number of years

Causes of Wastage : The chief causes given for wastage were failure to conceive when required, low production and mastitis, Less important causes were stated to be calving trouble, not milking cleanly (in non-stripping herds), low test (in tested herds), accidents, bad feet, abortion and tuberculosis.

The importance given to low production as a cause of wastage is of interest in view of the fact that it is difficult to see how many of the farmers could have much knowledge of the production of individual animals.

However this category includes animals culled towards the ends of their lactations to make room for fresh calvers. In other words this culling was in part for stage of lactation, not low production. One farmer had kept a record of the causes of wastage in his herd. Low production was given as the chief one, but in view of the confusion in the use of this term, the figures are not of much value.

Bad feet was cited as a cause of trouble on one farm where scoria had been used in gateways and a raceway. Since there is no local source of gravel, any alternative to scoria is likely to be costly.

Detection of Low Producers : All animals in herd 11 were under Group Herd test. In the other pedigree herds, 7 and 10, pedigrees, cows were tested but not grades.

Farmers 5 and 9 used their own milk recording systems The former had been doing this for several years with a G.V.B. machine. The latter had only recently begun recording and used special cheap testing buckets made to his own specifications. In neither of these cases were fat tests carried out, but the farmers had some basis for culling on production.

The remaining eight farmers had no satisfactory method for checking the production of their cows. They could, of course, milk a cow into a bucket if they so desired. For labour reasons this was seldom done.

Stock Replacement

Methods of Obtaining Replacements : Farmers may rear their own replacements or purchase them. Like the majority of town milk supply farmers in the district, these farmers purchased almost all their replacements. Two of the pedigree farmers (7 and 11) purchased some pedigrees to replace grades, and the other, farmer 10, bought some pedigrees each year.

At least two farmers roundly condemned the practice of purchase of replacements at saleyards and intended to rear as many as possible of the own in future. There was general agreement among the remainder as to the risks involved in buying, especially at sales.

The following table summarises the position on the surveyed farms.

TABLE 32

| Farm | Type of stock purchased | How purchased |
|---|---|---|
| 1 | Heifers | At sales |
| 2 | Heifers | At sales |
| 3 | Heifers and 2nd calvers | At sales and privately |
| 4 | Heifers | At sales and from dealers |
| 5 | Heifers and mature cows | Through one dealer |
| 6 | Heifers and mature cows | At sales, privately, dealers |
| 7 | Heifers and mature cows | Pedigrees - divers ways |
| 8 | Heifers to 4th calvers | At sales |
| 9 | Heifers and mature cows | At sales and privately |
| 10 | Heifers and mature cows | Pedigrees - divers ways |
| 11 | Calves | Pedigrees - divers ways |
| 12 | Mature cows | At sales |
| 13 | 3 year old heifers | Privately |

These were the usual methods for each farm, and may have been departed from on occasion. In 1945 farmer 9 bought yearling heifers instead of heifers "on the drop". Pedigree stock was not usually purchased through the same channels as grade stock.

Five of the farmers (4, 5, 8, 12, and 13) purchased all their replacements.

Five reared a few but purchased most of them (1, 2, 3, 6, and 9).

The remaining three herds are pedigree herds and some stock were reared for sale purposes as well as for herd replacement.

Purchase of Replacements : Replacements may be purchased at sales, through dealers, or privately.

The chief sale centres are at Westfield and Pukekohe where there are considerable offerings of dairy stock. Heifers offered for sale should be free from disease but may be poorly bred. Information of their origin and calving dates may be in accurate or impossible to obtain. The mature cows offered are in many cases, culls from seasonal dairy herds. They may be calving too late for a seasonal herd and in this respect be suitable for a town milk supplier, provided that their late calving is not due to their being naturally hard to get in calf. There is a considerable risk that they have been culled for disease or low production.

Purchase of replacements through dealers is a better method since the dealer is likely to have a better knowledge of where sound stock can be obtained than the farmer. In addition the fact that the dealer had his reputation to protect and perhaps his firm's customers to keep affords the farmer some protection. Farmer 5 had the best purchase system of the farms in the survey. A dealer who was a personal friend provided his replacements and would take back and replace any found unsatisfactory after a short trial. There was still some risk of introducing disease into the herd by this system particularly as some mature cows were bought.

If suitable arrangements can be made buying privately is probably the best purchase system. Planning well ahead is required if a permanent arrangement with a breeder is to be made Those farmers who bought replacements privately had no such arrangement but purchased suitable animals whenever available.

Home Rearing of Replacements : Periods when calves were saved.

Farm 1 Spring

Farms 2, 6, and 7 At any period of the year. Farmer 6 tried to avoid having more than 3 or 4 at once. These farmers tried to save calves from their best cows if possible.

Farm 3 Mainly June, July, and August.

Farm 10 March, April, and May

Farm 11 December till May

The time when calves were saved depended largely on the calving of the bulk of the herd. This had a bearing on the cost of feeding, since use of surplus milk in the spring would no cost as much as winter milk when supplies were shorter In addition pasture conditions for spring calves would be bette thus saving milk and other supplements.

Effect of Young Stock and Bulls Carried on Per Acre Production

The number of young and other dry stock carried on a farm will reduce the number of milking stock which can be run. If more milking cows could be run the per acre production of the farm would be raised. In order to make an allowance for this adjustments to per acre production have been made on the following hypothetical basis. Calculations based on weights of young stock at Massey College, recorded by the Dairy Researc Institute, and using the feed requirements for stock by Morrisc (20th edition) indicate the young animal in the period from birth to calving at 2 years old uses sufficient grass and suppl ments to provide for about 1¼ cows producing about 225 lbs. of butterfat per year. Whether this would be the case in actual practice is not known.

Since young stock would be used as followers in many instances and would consume feed which would not be given to milking stock, this proportion is probably too high. Hence it has been taken that the young animal from birth to calving uses feed equivalent to the requirements of one milking cow for a year. Five young animals in their first year of age, plus five in their second year, thus replace five milking cows over a period of a year.

A bull is usually a larger animal than a cow and has a higher maintenance requirement. His paddock is probably larger than would be sufficient to contain his theoretical food requirements. It has been taken that on the average a bull will replace about one average cow in milk.

Table 33 shows the average per acre productions of the farms corrected on the above basis for the average number of young stock and bulls run.

TABLE 33

| Group | Farm | Out-put per acre (Uncorrected) in gallons | Production per acre (Corrected for dry stock) in gallons |
|---|---|---|---|
| A | 1 | 435 | 463 |
| | 2 | 318 | 354 |
| | 3 | 283 | 299 |
| | 4 | 384 | 394 |
| | 5 | 324 | 334 |
| B | 6 | 260 | 289 |
| | 7 | 310 | 385 |
| | 8 | 489 | 503 |
| | 9 | 356 | 389 |
| C | 10 | 387 | 454 |
| | 11 | 477 | 553 |
| D | 12 | 646 | 662 |
| | 13 | 477 | 493 |

The greatest effect of this correction has been to show a great increase in the per acre production figures for the pedigree farms (7, 10, and 11) where young stock were more important. This allows the effect of the meal purchase policies on farm 10 and, in particular, farm 11 to be seen more clearly.

Effect of Herd Maintenance and Improvement Policy on Per Acre Production

Herd wastage would not have as great an effect on the per acre production of a farm buying replacements shortly before calving as on a farm where replacements were home reared. However most of the farmers tried to purchase heifers which would be expected to have lower production than mature cows. Because of this, factors tending to lower herd wastage would tend to raise per acre production. It is necessary for information on the extent of wastage and causes of wastage on town milk supply farms to be ascertained accurately. The differences in wastage rates on farms buying replacements and those rearing their own should be investigated.

Three farmers tested most of their cows, and two "milk recorded" their herds. Eight farmers had no sound basis for culling on low production. With the prevalence of the

system of obtaining replacements by purchase, sometimes obtaining mature cows from saleyards, some form of testing is badly needed. It seems very likely that an increase in per acre production on several of the farms would result from culling the low producers in these herds and replacing them with better cows.

Improvement of the dairy stock used would raise per acre production since fewer animals would be needed on each farm to produce the same or a higher out-put. Quality of feed might limit the extent to which improvement of stock would be effective on some farms, particularly in the winter period.

The method of obtaining replacements influences per acre production. If purchased the quality of stock is likely to be inferior and the replacement rate high, but no young stock need be carried, thus such a policy tends to give high per acre production. Home rearing of young stock has advantages from the herd improvement and owner's interest point of view but the necessity for rearing calves and grazing young stock is likely to be costly in terms of loss of milk in comparison with a purchase system.

Even if it were decided to rear replacements it is unlikely that a farmer could plan the numbers and calving dates of the heifers so well that he would not need to purchase some replacements at times. Unless a large excess of young stock were carried a home rearing of replacement policy would be a compromise between home rearing and purchase policies

SUMMARY

Some factors affecting per acre production have been discussed.

These are :-

Breed used, which determines the test of the supply

Production per cow

Purchase of feedstuffs

Spread of production over the year

Pasture management

Labour considerations

Herd maintenance and improvement policies

Many of these also affect the spread of production. The same dificulties as in the previous section prevent the demonstration of the effects of individual factors on the production per acre of these farms. The necessity for spreading production over the year must make per acre production lower than if production were seasonal, provided that the same quantities of purchased feedstuffs are used.

It can be seen that the problems involved in town milk production both from the point of view of spread of production and production per acre are complex. The policy of these farmers in respect of the factors which have been considered varied widely. It would be very difficult to decide which combination of methods would be most profitable for any farmer producing town milk in this district to adopt.

# SECTION III

## MILK QUALITY CONSIDERATIONS

### Pasteurisation

All the milk produced on these farms and used for town supply was pasteurised at treating houses before delivery to consumers.

### Tuberculosis

Two of the farmers had their herds tuberculin tested long before this survey was carried out but none had been tested in recent years. So far no concerted effort has been made to eliminate this disease in town milk or other herds in this district. Obviously, with the prevalence of the system of purchasing replacements, it would be impracticable to maintain a tuberculosis free herd unless home rearing became more usual. Even if replacements were home reared, it would be almost impossible to avoid the necessity to purchase some animals at tir

### Abortion

None of the farmers carried out the agglutination test for contagious abortion. The use of Strain 19 vaccine has reduced the incidence of the disease.

### Mastitis

This was considered the most important disease from the wastage point of view. Clinical cases should be detected by the milkers. Failing this infected milk may be detected at treating houses or by Milk Board inspectors. The Milk Board has recently been using an instrument working on the chloride content of milk to detect diseased animals in herds known to be producing milk of high leucocyte content. Individual quarters can be tested without appreciable loss of time during milking. The officers using this instrument were satisfied that it was a useful means of rapidly detecting diseas animals and stated that its use had checked well with leucocyt counts carried out by the Board.

What proportion of cows infected with mastitis can be detected by this means is not known.

Standard of Cowsheds

Three of the cowsheds were new, easy to clean and appeared to be entirely satisfactory.

Five were old sheds which appeared to require replacement or renovation.

The remaining five were in fair condition.

The replacement of old sheds has been made difficult if not impossible by the wartime and present shortage of building materials. Consequently the Dairy Inspectors have found it difficult to condemn any cowshed in recent years.

Cooling of Milk

Two farmers used refrigerating units. That on farm 5 was cooling the milk to 40°F, and on farm 9 to 43°F when teste

The remainder used water only. In all cases the supply originated from bores and the temperature of the bore water (mid summer) was 60°F to 63°F. In some cases the water passed through a considerable length of piping and the first water used on two farms was 66° to 68°. This later fell to the range shown above.

Even with efficient coolers this would not cool the milk sufficiently. On two farms the milk was not cooled below 73°F. This was because of too fast a flow for the type of cooling unit used.

Collection of Milk

On farms 5 and 12 the milk was taken to the gate for collection and remained on open stands until collected. Four of the farmers with newer types of cowsheds kept the milk inside the shed behind a sliding door until collected. The remainder used uncovered stands at the cowsheds. In no case was the milk left on the stands long since the times of collection determined the times of milking and it was usual for the collecting lorry to arrive very shortly after milking finished.

Under the present regulations of the Milk Board, collection from cowsheds is encouraged. Usually cattlestops are used to provide quick access for the collecting lorry.

This system works well, particularly where new sheds have been designed with a suitable concrete floor above ground level as the milk can be kept under shelter behind a sliding door and is easily transferred to the lorry with a minimum of effort. It is probable that this system will be incorporated in all cowshe as older ones are replaced.

REDUCTASE TESTS AND PLATE COUNTS

The following tables are based on information provide by the Auckland Milk Board (Appendix II).

Reductase Tests

Table 34 shows the number of reductase tests carried out by Milk Board Inspectors and the number falling below 5 hours. Because the tests were not carried out at the same tim for each herd and the numbers carried out differ considerably b tween herds the figures for each herd with records for 3 years has been shown separately.

TABLE 34

| Month | No. of Tests | Farm 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan. | 25 | | | | | | 5 | | | | | | | |
| Feb. | 33 | | | 3 | 1 | 1 | 2 | 1 | | | 1 | 2 | | 2 |
| March | 24 | | | | 2 | 2 | 2 | 1 | | | | 1 | | |
| April | 18 | | | | | | | 1 | | | | | | |
| May | 24 | | | | | | | | | | | | | |
| June | 32 | | | | | | | | | | | | | |
| July | 27 | | | | | | | | | | | | | |
| Aug. | 32 | | | | | | | | | | | | | |
| Sept. | 20 | | | | | | | | | | | | | |
| Oct. | 19 | | | | | | | 1 | | | | 1 | | 1 |
| Nov. | 32 | | | | | 2 | | | | | | 1 | | |
| Dec. | 17 | | | | | | | | | | | | | |
| Total tests | 303 | | | | | | | | | | | | | |

The period of worst reductase tests has been about February and March. These tests do not by any means indicate the true standards of the supplies as the tests were not frequent or carried out at regular intervals.

Plate Counts

The following table shows the number of plate counts above 100,000 organisms per cc.

TABLE 35

| Month | No. of Tests | Farms 1 | 2 | 3 | 4 | 5 | 6 | 7 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan. | 25 | | | | | | 4 | | | | | 1 |
| Feb. | 33 | | | 3 | 1 | 1 | 1 | 1 | 2 | 2 | | 1 |
| March | 24 | | | | 1 | | | 1 | | 1 | | 1 |
| April | 18 | | | | | | | 1 | | | | |
| May | 24 | | | | | | 1 | 1 | | | | |
| June | 32 | 1 | | | | | | | 1 | | | 1 |
| July | 27 | | | | | | | | 1 | | | |
| Aug. | 32 | | | | 1 | 1 | 2 | | 1 | | | |
| Sept. | 20 | 2 | | | | | | | 1 | | | |
| Oct. | 19 | 1 | | | | | 1 | 1 | | 1 | 1 | 1 |
| Nov. | 32 | | | | | | 1 | 1 | 1 | | | |
| Dec. | 17 | | | | | | | | 1 | | | |
| Total tests | 303 | | | | | | | | | | | |

The grouping of these tests is not so clearly defined as in the case of reductase tests. However they appear to be of a higher standard in the colder months of the year and worst about February.

Improvement of the standard of the milk supplied in the hotter months by better cooling would not be possible in several cases unless refrigerators were used since the temperature of the cooling water was relatively high. Some of the farmers, as indicated previously could have made better use of the water available than they were doing.

A higher standard of shed hygiene together with adequate cover for the milk both before collection and on the collection lorries might make the use of refrigerating units unnecessary. If refrigerators are shown to be necessary the price of milk to the consumer would probably be raised to cover the extra costs involved. Any increase in cost should be avoided if possible since the result would probably be decreased use of milk by people in lower income groups who need milk more than those better able to pay a higher price.

VARIATION IN THE SOLIDS NOT FAT CONTENT OF SUPPLIES

Because the tests were not spread evenly over the year or evenly between farms the number of solids not fat tests falling below 8.5% (the legal minimum) have been shown separately for the eleven farms with records for the three years.

TABLE 36

| Month | Farm | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 10 | 11 | 12 | 13 | |
| Jan. | | 1 | | 2 | | 2 | | 2 | 2 | | 1 | |
| Feb. | 1 | 1 | | 1 | 1 | 1 | 2 | | 1 | | | |
| March | | | | 1 | | 1 | | 1 | 3 | | | |
| April | | | | | | | | 1 | | | | |
| May | | | | | | | | 1 | | | | |
| June | 1 | 1 | | | | | | 2 | | 1 | | |
| July | | 2 | 1 | 1 | | | 1 | 3 | 1 | | 1 | |
| Aug. | | 1 | | 1 | 1 | 1 | 1 | 3 | 3 | | 1 | |
| Sept. | | | | 1 | | | 2 | 1 | 1 | | | |
| Oct. | | | | | | | | | | | | |
| Nov. | | | | | | | | | | | | |
| Dec. | | | | | | | | | | | | |

Of the 23 falling below 8.5% in the January, February March period 15 were during the severe drought of early 1946. The data is not very satisfactory but the two periods when most low solids not fat tests occurred were those which would be expected (Riddet et al. N. Z. Jnl. Sc. & Tech., vol. 23, 2a, 1941 and J. W. McLean "Report of the Investigation of the Problem of Low Non Fatty Solids in the Christchurch Milk Supply, 1947).

Two of the pedigree Friesian herds (10 and 11) had more low solids not fat tests than the other herds indicating the vulnerability of the solids not fat test of low testing herds to a lowered plane of nutrition.

The problem of variations in the solids not fat content of milk is at present being investigated by the Dairy Research Institute.

# SECTION IV

## DISCUSSION

### SPREAD OF PRODUCTION

In maintaining a suitable spread of production the major problem of these farmers appears to be the provision of adequate feed during periods of poor pasture growth.

This problem is complicated by the question of labour requirement.

#### Pasture Management

Probably the most useful approach to the feeding problem lies in the extension of the period of pasture growth as much as possible, since this minimises the losses involved in conserving pasture and the labour required for supplementary feeding.

In doing this, it may be found that short rotation ryegrass, either in permanent pastures or in special pastures will be valuable in increasing the quantity of winter and early spring grass available. Its persistency under these conditions is not known and its comparatively poor autumn growth would perhaps be a disadvantage.

Increased use of silage rather than hay would permit earlier harvesting and make more grass available over the dry period. The labour required to harvest and feed out silage would be a disadvantage. It is thought that the value of good silage as a feed for milking stock had not been fully realized by some of the farmers, and its greater use from this point of view as well as better spread of pasture growth might well outweight the disadvantage compared with hay from the labour point of view.

Some of the farmers who produced a greater proportion of summer and autumn milk used dressings of superphosphate in the spring months. Probably the adoption of this system, especially on hay and silage paddocks would assist other farmers to attain a better spread of production. Sulphate of ammonia had been used by farmers in this district in the past, but had become unpopular. This was probably due to misuse, and perhaps

the judicious use of this fertilizer on well limed paddocks with an adequate supply of phosphates, not more frequently than once in two or three years on the same area would assist in obtaining better pasture production in the winter and early spring

Autumn saved grass is a useful means of conserving pasture for winter use. Difficulties may be experienced in saving areas if paspalum is unduly prevalent, since closing would require to be earlier if sufficient growth was to be obtained, than if the pasture was dominantly ryegrass. Use of electric fences or some other form of break feeding would be advisable on farms not already using this method, to avoid wasting valuable grass.

Pasture Conservation

One of the costs of spreading production is the losses involved in conserving hay and silage (Sears, Proc. N. Z. Soc. An. Prod., 1947). Another disadvantage of these feeds is that although suitable as part of the rations of milking stock, and for dry stock, they are not of sufficiently high quality to form a large part of rations for cows capable of high production. For these reasons grass drying may have a place in this area. It is not thought that it would entirely replace hay and silage. The cost of grass drying would determine the extent to which its use would be profitable. Probably a mobile plant would be most suitable. The cost aspect of grass drying with plant owned on a cooperative basis would merit investigation.

Overseas workers (Lewis, Jnl. Min. of Agriculture, 1939-40; Sprague, New Jersey Agric. Experiment Station Bulletin 644, 1938) have reported improvement in the protein content of hay with the application of nitrogenous fertilizers two to three weeks before cutting. Perhaps this could be tried under experimental conditions. The losses in protein during conservation might make this method uneconomical in practice.

Crops

For a summer crop, chou mollier would probably be more suitable than the soft turnips used by some of the farmers. Not only is its nutritive value superior, but sown early in late

September or early October it would have a chance to produce a considerable amount of feed before the dry weather. A disadvantage of later sown crops is that if dry weather starts early and is severe, there is likely to be little if any feed availabl from the crop.

Lucerne might be considered as a crop for this period, but it does not grow sufficiently well on most of the area, mainly because of a heavy clay subsoil. On the Ohaewai loam (soil type 1) it will grow, but the area of this soil used for dairying is limited and is often very rocky and unploughable in places. In any case it is likely that the greater return over the year from pasture would make lucerne growing inadvisabl

Rate of Stocking

An even spread of production over the year demands that considerable quantities of supplements be used. Particularly on farms where these are entirely home produced the rate of stocking demands considerable attention. Overstocking not only increases the need for supplements, but also makes it difficult to provide a sufficient quantity.

Because of the difficulty is measuring per cow production, it was difficult to obtain an indication of the extent of overstocking on these farms. However there was an indication that on three farms overstocking had occurred. This does not mean that on these three farms the present concentration of stock could not be carried with efficient farming methods, but that for the feed produced over the three years under consideration, the number of animals appeared to be excessive.

Purchase of Feedstuffs

As indicated previously (page83 ) use of meals for winter feeding may be of assistance in increasing winter production, particularly if poor quality home produced supplements are used. The supply of concentrates has not been good, and prices have been high. In addition there is some disadvantage in their use for short periods in that cows come to expect them in the bail. Their most effective use requires a rationing system based on production which necessitates testing or milk

recording. This may increase labour difficulties.

Labour

Production per labour unit was high on these farms yet if the long hours of work and year round milking are considered the wages paid were not as high as would be expected (page71 ). In several cases they were no different from those paid on seasonal dairy farms. This area is close to the city and much less arduous and equally well paid work is likely to be obtainable at present. Under these conditions it appears that these farmers would have to pay higher wages or make working conditions easier in order to attract additional labour to the town milk industry.

PER ACRE PRODUCTION

Breed Used

The most suitable breed to use, if adequate replacements can be obtained, depends largely on that which will give the greatest out-put of milk in gallons per acre. For this reason the Friesian is most suitable. However it is generally agreed that in order not to supply milk of below 3.5% test at any time, an average test of about 4.3% is required for the herd(Neville, New Zealand Valuers' Institute Bulletin, September 1945; also recommended by the Milk Commission, 1944). It is unlikely that a Friesian herd with such a test can be built up, especially if replacements are purchased. The problem then becomes one of whether to use Friesians with a breed such as the Jersey in a mixed herd, or to use Shorthorns or Ayrshires with a breed average test nearer that required. Perhaps the answer may be provided by crossbred stock, such as a Friesian Jersey cross, but since insufficient information is available about such crosses at present this is purely speculative.

The cull value of stock has been given attention by some farmers. At the present price of town milk it would take comparatively few gallons increase in milk production per year for a cow remaining in a herd three or four years to out-

weigh a pound or two decreased cull value at the end of the useful life. Because of this the farmer's attention would probably be much better concentrated on selection for milk producing ability with little if any devoted to beef value.

Herd Replacement

This is a difficult problem. Purchase of replacemen probably results in a higher per acre production, less labour involved in rearing young stock, probably a higher replacement rate and more worry with disease than if replacements are reared

Home rearing of replacements gives an advantage in the possibility of a constructive breeding programme and greater interest to the farmer than if replacements are purchased. The cost of rearing young stock may be reduced to some extent by grazing off the farm. As indicated previously it would be unlikely that the purchase of some replacements could be avoided Purchase of heifers from a good source may provide sound animal: of good quality.

The decision made by a farmer would probably be influenced by the labour involved, the quality of replacements he could purchase, and his interest in constructive breeding.

Testing

Whatever replacement system is adopted, some form of testing or milk recording is desirable. It is perhaps most necessary when mature cows are purchased as replacements at saleyards, since poor animals may be introduced into the herd and not noticed unless tested in some way.

If replacements are reared testing is needed to guide both the culling and breeding programmes. In addition, as indicated previously, a system of testing is necessary to make the best use of concentrates if they are used.

Milk recording as carried out by farmer 5 has the disadvantage that nothing is known of the test of the milk of individual animals, making adjustment of the herd average test by replacing animals difficult. For this reason either the

usual Group Herd Test or a system similar to the Association Own Sample method would be preferable.

While the demand for Group Herd Testing from seasonal farmers who rear stock is unsatisfied it would be wasteful to use this method in herds where all calves are slaughtered. Hence a suitable alternative operated by the farmers themselves or through their producers' associations would probably be most useful.

## CONCLUSION

The chief problems involved in the production of market milk on these farms appear to be as follows:-

(1) The provision of adequate feed of sufficiently high quality for milking stock in the winter and early spring and summer periods.

More specifically this involves

(a) methods of spreading pasture production more evenly throughout the year.

(b) methods of conserving pasture so as to minimuze conservation losses and to provide a food of sufficiently high quality for milking stock. Methods used require to be economical of labour.

(c) whether to purchase concentrates, either for all the year round feeding for for winter use only.

(d) whether cropping is advisable, and if so, what crops are most satisfactory.

(2) Herd replacement. A major question is whether it is better to buy replacements or rear them. The Milk Commission Report (1944) stated that farmers who reared their own replacements achieved better results. What these better results were - in per acre production, less disease, etc. were not stated, nor was any basis for this statement presented.

Individual factors concerned with this problem are

(a) how much higher wastage rates are under systems of purchasing replacements than if replacements are home reared.

(b) what improvement in production is likely to ensue from a herd improvement policy made possible by home rearing of stock.

(c) what the cost of rearing replacements is, in terms of milk and purchased feed used, the production lost through lowering of the number of cows which can be carried, the labour involved in calf feeding and the increased cost of herd sires.

At present herd sires can be very cheap but in order to carry out a policy of herd improvement the use of better sires, almost certainly of higher cost, would be necessary.

(d) what alternative methods of rearing replacements might lower costs.

(3) The most suitable breed or combination of breeds, either in a mixed herd or crossbred stock which can be used The two factors to be considered here are the need for maximum out-put of milk per acre, and the necessity for avoidin production of milk below the minimum prescribed for butter-fat test and solids not fat. content.

(4) The level of contract to undertake. This is affected largely by the question of the provision of feed throughout the year. The cost of provision of supplementary feed, including labour costs and conservation losses, in periods of poor pasture production may be such that a farmer would receive the greatest net return by supplying only a small proportion of his total out-put as town milk. On the other hand it might pay him to sell as much of his supply as town milk as he can arrange a contract for. This is a "cost of production" matter and is likely to be very difficult to determine for any particular farm.

(5) Labour. All the year round milking and handling greater quantities of supplementary feed make the work on town milk supply farms much more onerous than on seasonal supply farms. Compensation for this is not entirely a matter of increased payment. Labour needs some spell during the year. This may be made possible on farms where a number of men are employed, by means of generous holiday periods. On "one man" units or where two men milk a large herd this may not be possible.

PLANNING THE SUPPLY OF MILK TO AUCKLAND CITY

Most of these farmers had difficulty in maintaining their supply over the dry period. While it is true that some of them made little effort to maintain it, in order to do so a considerable amount of supplementary feeding would be required particularly on the lighter soil types.

The lighter soil types are the most suitable for winter milk production. In view of this it may be questioned whether best use is being made of the area available, considering the supply to Auckland city as a whole, by retaining a level contract system.

If the farmers on the lighter soil types were permitted to produce little or no ~~contract~~ milk in the dry months, they could so use their supplements and arrange their farming methods to permit a higher level of winter milk production. In addition to this they would be provided with a slack period as in seasonal farming which would reduce the drudgery involved in all the year round milking.

There are areas such as the Aka Aka swamp which are of little or no use for winter milk production, but which could provide summer milk with the necessity for little if any supplementary feeding.

Modern transport facilities have reduced the necessity for production of town milk close to the area of consumption. Taking advantage of these and the suitability of various soil types for production at different periods of the year would possibly provide a more reliable and perhaps cheaper supply of milk for Auckland City. It would certainly help to reduce the drudgery involved in all the year round milking which is necessary with the present contract system in force.

In the past Auckland has drawn milk from outlying areas in the autumn* (Milk Commission Report, 1944). In 1944

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* The New Zealand Cooperative Dairy Co. Ltd. supplied in milk and cream computed as milk, 680,576 gallons in the months of February, March, April and May 1943. These "accommodation" supplies have been reported as often unsatisfactory.

this also occurred and to a much greater extent in 1946 when severe drought conditions prevailed. During the period January to July 1944 just over ½ million gallons was drawn from cheese factories. The summer of early 1945 was unusually favourable for pasture growth in the area close to Auckland but during June and July 75,961 gallons of accommodation milk were drawn from two outlying factories.

Consequently it can be seen that this movement of milk into Auckland from outlying districts has already been occurring at times. Concentrating on the lighter soil types for winter milk production might obviate the necessity for winter milk from outside sources to a great extent. An organised system from suitable areas would ensure a better supply in dry periods, and that supply could be supervised so that its quality was as high as that of the remainder of the supply.

A soil survey of the area has already been done (Soil Survey Bureau). Arranging the supply to take best advantage of natural conditions would entail a considerable amount of work both in allocation of contracts, calling for different levels of supply at different periods of the year on the various soil types, and price adjustment. However an investigation into such a scheme might prove well worth while both from the point of view of the supply to consumers and the labour and farmers on town milk supply farms.

Some suggestions have been made with regard to these problems. More detailed study is required before any definite conclusions can be drawn, and before this can be undertaken sufficient reliable information is necessary. Probably the most satisfactory method of obtaining this is to get farmers who are willing to co-operate to keep necessary detailed records over a number of years.

ACKNOWLEDGEMENTS

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The Director of the Milk Marketing Division.

The officers of the Milk Treating Houses.

and others who supplied information.

## APPENDIX I

## FARM SURVEY

1. Location of Farm

2. Area of farm  Type of Tenure  Length of occupation

3. Area of runoff
   Location of runoff
   Distance from farm

4. Soil type(s)
   Areas of different soil types

5. Contour
   Area of flat
   Area rolling
   Area plowable
   Area non-plowable

6. State of improvement
   Area fully improved
   Area partially improved
   Area unimproved

7. Shelter
   Area in bush
   Shelter belts - type & length
   Hedges " " "

8. Subdivision
   Size of paddocks
   Type and cost of fencing used for subdivision
   Annual cost of repair and maintenance of fences

9. Pastures
   Areas in different pastures
   Average length of life of pastures
   Pasture management policy over season - rotation, topping, etc.
   Species dominant in various seasons
   Grazing
   Frequency of changes of paddocks

10. Pugging
   Extent to which pugging occurs
   Means used (a) To avoid or minimise pugging
   (b) To deal with badly pugged areas

11. Manuring

| | 1944 | | 1945 | | 1946 | |
|---|---|---|---|---|---|---|
| Type | Super | Lime | Super | Lime | Super | Lime |
| Quantity/ac. | | | | | | |
| No. acres | | | | | | |
| Other Ferts. | | | | | | |

How applied
When applied

Shed washing if used
How applied
What land applied to (treatment of land)

Manure from feeding shed

If sulphate of ammonia or ammoniated super used in the past
Value and effect on pasture

12. Stocking (see next page)

13. Wastage rate

| | 1944 | 1945 | 1946 |
|---|---|---|---|
| Causes of wastage | | | |
| T/B testing & wastage | | | |
| Prices for culls | | | |
| Culling policy | | | |

14. Replacements

(a) Breeding own

| | 1944 | 1945 | 1946 |
|---|---|---|---|
| No. calves saved | | | |
| When saved | | | |
| Feeding and management policy with calves | | | |

(b) Buying

| | 1944 | 1945 | 1946 |
|---|---|---|---|
| (i) Privately | | | |
| Cost | | | |
| Nos. | | | |
| (ii) At sales | | | |
| Cost | | | |
| Nos. | | | |
| Age of stock bought | | | |
| When bought | | | |

15. Shed management

| | 1944 | 1945 | 1946 |
|---|---|---|---|
| Stripping | | | |
| Non stripping | | | |
| Testing | | | |

16. Stock management

Calving dates

| Nos. calving | 1944 | 1945 | 1946 |
|---|---|---|---|
| Jan. | | | |
| Feb. | | | |
| Mar. | | | |
| Apr. | | | |
| May | | | |
| June | | | |
| July | | | |
| Aug. | | | |
| Sep. | | | |
| Oct. | | | |
| Nov. | | | |
| Dec. | | | |

Lactation lengths

| | 1944 | | | | | | 1945 | | | | | | 1946 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cows in milk | | Cows dry | | | | Cows in milk | | Cows dry | | | | Cows in milk | | Cows dry | | | |
| | 1st Calvers | Mature | To milk | To sell | Young stock | Bulls Other | 1st Calvers | Mature | To milk | To sell | Young stock | Bulls Other | 1st Calvers | Mature | To milk | To sell | Young Stock | Bulls Other |
| Jan. | | | | | | | | | | | | | | | | | | |
| Feb. | | | | | | | | | | | | | | | | | | |
| Mar. | | | | | | | | | | | | | | | | | | |
| Apr. | | | | | | | | | | | | | | | | | | |
| May | | | | | | | | | | | | | | | | | | |
| June | | | | | | | | | | | | | | | | | | |
| July | | | | | | | | | | | | | | | | | | |
| Aug. | | | | | | | | | | | | | | | | | | |
| Sept. | | | | | | | | | | | | | | | | | | |
| Oct. | | | | | | | | | | | | | | | | | | |
| Nov. | | | | | | | | | | | | | | | | | | |
| Dec. | | | | | | | | | | | | | | | | | | |

Breed(s) used

Breeding Policy

17. Buildings

| | Size | Present value | Age |
|---|---|---|---|
| Milking shed | | | |
| Feeding shed | | | |
| Hay barn(s) | | | |
| Silage pit(s) | | | |
| Stable | | | |
| Implement shed | | | |
| Calf shed | | | |
| Other | | | |

18. Water supply

Natural

Gravity

Pumped — Cost of pumping

No. troughs — type — cost

Piping — length

19. Milking plant

Machines — doubled up units etc.)

Power unit

Cooling water

Strainers etc

Cans Owned — no. — cost

Hired — no. — cost

Refrigeration equipment

20. Hay and silage making

Mower

Sweep(s)

Rake

Tedder

Stacker

Other

Cultivating

Plow(s)

Disc(s)

Harrows

Drill

Leveller

Roller

Other

Topdresser

Grass harrows

Shed manure distributor

Sledge

Dray

Truck

Trailer

Power Tractor Cost Type

Horses No.

Sundry Fencing gear

Harness

Other

Implements owned Conjunction

Implements borrowed

21. Labour

(a) Permanent

(i) Sharemilkers Shares

(ii) Married Wages

(iii) Single

(iv) Family assistance

No. Time per day

Wages

(b) Casual labour

(c) Contract labour

(d) Exchange of labour between farms

(e) Insurance on wages

(f) Times of rising and milk

Simmer a.m. p.m.

Winter a.m. p.m.

(g) Holidays

SUPPLEMENTARY FEEDING

22. Periods when supplements fed

Supplements used

How fed indoors
outside

Type of feed and quantities

Fed to

(a) Dry stock

(b) Low producers

(c) High producers

Supplements

| | 1944 Area | Tons | 1945 Area | Tons | 1946 Area | Tons |
|---|---|---|---|---|---|---|
| (a) Hay Amount saved | | | | | | |
| Baled | | | | | | |
| Stacked | | | | | | |
| Work done by | | | | | | |
| (i) Farm staff and plant | | | | | | |
| (ii) Contract Cost | | | | | | |

| (b) Silage | 1944 Area | Tons | 1945 Area | Tons | 1946 Area | Tons |
|---|---|---|---|---|---|---|
| Amount saved | | | | | | |
| Stack | | | | | | |
| Pit or silo | | | | | | |
| Work done by | | | | | | |
| (i) Farm staff and plant | | | | | | |
| (ii) Contract Cost | | | | | | |

(c) Crops

(i) Crop(s)
Type of crop(s)
Area(s)
Yield(s)
Utilization Grazed Fed out
Put in by (a) Farm staff and plant
(b) Contract

(ii) Winter crops
Type of crop(s)
Area(s)
Yield(s)
Utilization Grazed Fed out
Put in by (a) Farm staff and plant
(b) Contract

(iii) Catch crop(s)
Type(s)
Area(s)
Yield(s)
Utilization
Put in by (a) Farm staff and plant
(b) Contract

Whether or not cropping fitted in with improvement work

Cost of resowing to pasture

When pasture sown

(d) Permanent crops

(i) Pampas

Area
Utilization
If interplanted (prairie grass, etc.)
Cost of establishment
Yield - (grazing, cow/days.)

(ii) Lucerne

Area
How and when utilized
Yield
(a) silage
(b) hay
(c) grazing
Cost of establishment
Manuring

(e) Autumn saved grass

| | 1944 | 1945 | 1945 |
|---|---|---|---|
| Area saved | | | |
| When closed | | | |
| How managed before closing | | | |
| When utilized | | | |
| How utilized (size of breaks, etc.) | | | |
| If feeding out on previous day's break | | | |
| Type of growth secured | | | |
| Effect on pastures | | | |

(f) Special pastures

Area
Constituents
Yield — Hay
Silage
Grazing
Length of life
Cost of establishment

(g) Purchased feed

| | | 1944 | 1945 | 1946 |
|---|---|---|---|---|
| Hay | Amount | | | |
| | Cost | | | |
| Roots | Type | | | |
| | Cost | | | |
| Meals | Type | | | |
| | Cost | | | |
| Other feeds | | | | |

(h) Grazing off

Own runoff
Area
Cost/yr.
Grazing whether used by dairy stock alone

Nos. of other stock grazed

| | | 1944 | 1945 | 1946 |
|---|---|---|---|---|
| Quantities | Hay | | | |
| | Silage | | | |
| Made and runoff | | | | |
| On agistment | | | | |

| | 1944 | 1945 | 1946 |
|---|---|---|---|
| Type No's. stock grazed off | | | |
| Length of time grazed off | | | |
| Cost of grazing | | | |

Amt. and type supplements fed by
(a) Owner of land
(b) Owner of stock

Cost of supplementary feeding

24. Drainage

Type of drains used

Length and size of open drains and cost

Areas and costs of tile and other drainage

25. Farm stores

26. Vet. expenses

27. Cartage

28. Power in shed (cost)

29. Dairy expenses

# MILK PRODUCTION

| | 1944 | | | | 1945 | | | | 1946 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Contract Price | Act. supply Price | Av. test | Price /gal. | Contract Price | Act. supply Price | Av. test | Price /gal. | Contract Price | Act. supply Price | Av. test | Price /gal. |
| Jan. | | | | | | | | | | | | |
| Feb. | | | | | | | | | | | | |
| Mar. | | | | | | | | | | | | |
| Apr. | | | | | | | | | | | | |
| May | | | | | | | | | | | | |
| June | | | | | | | | | | | | |
| July | | | | | | | | | | | | |
| Aug. | | | | | | | | | | | | |
| Sept. | | | | | | | | | | | | |
| Oct. | | | | | | | | | | | | |
| Nov. | | | | | | | | | | | | |
| Dec. | | | | | | | | | | | | |
| Totals | | | | | | | | | | | | |
| Av. test | | | | | | | | | | | | |
| Av. price/gal. | | | | | | | | | | | | |
| Any premium for quality | | | | | | | | | | | | |

| | Surplus | Deficit | Surplus | Deficit | Surplus | Deficit |
|---|---|---|---|---|---|---|
| Jan. | | | | | | |
| Feb. | | | | | | |
| Mar. | | | | | | |
| Apr. | | | | | | |
| May | | | | | | |
| June | | | | | | |
| July | | | | | | |
| Aug. | | | | | | |
| Sept. | | | | | | |
| Oct. | | | | | | |
| Nov. | | | | | | |
| Dec. | | | | | | |

Method of disposal of surpluses (above allowed limit)
Methods of making up deficiencies

Times of collection Night Morning

Cooling plant

Temperature of cooling water

Maximum temperature of milk before collection

Summer Winter

Type of collecting stand

Milk grade (Reductase test)

## APPENDIX II

| | 1944 Gallons | 1945 Gallons | 1946 Gallons |
|---|---|---|---|
| January | 2,140 | 3,273 | 2,657 |
| February | 2,328 | 3,273 | 2,059 |
| March | 3,378 | 2,569 | 2,406 |
| April | 3,144 | 3,394 | 3,234 |
| May | 3,475 | 3,913 | 3,534 |
| June | 3,353 | 3,429 | 3,511 |
| July | 3,240 | 3,290 | 3,653 |
| August | 3,032 | 3,714 | 3,873 |
| September | 3,335 | 3,928 | 4,312 |
| October | 3,531 | 4,147 | 4,484 |
| November | 3,599 | 3,885 | 4,215 |
| December | 3,559 | 3,309 | 4,083 |

| Date | Evening & Morning | B/Fat | S.N.F. | Reductase | Plate Count |
|---|---|---|---|---|---|
| 31.1.44 | E | 4.3 | 8.3 | 10½ hrs. | 30,000 |
| 13.3.44 | M | 3.7 | 8.5 | 7¼ | 33,000 |
| 8.6.44 | M | 3.8 | 8.5 | +9 | 6,000 |
| 20.7.44 | M | 3.5 | 8.3 | 9 | 9,000 |
| 9.8.44 | M | | | +7¼ | 11,000 |
| 31.8.44 | M | 3.5 | 8.3 | 6½½ | 130,000 |
| 2.11.44 | E | 4.0 | 9.0 | 6½ | 48,000 |
| 30.11.44 | E | 4.3 | 8.8 | 9 | 48,000 |
| 18.12.44 | | | | +6½½ | 9,000 |
| 12.1.45 | E | 4.7 | 9.2 | 6½ | 72,000 |
| 19.2.45 | E | 4.5 | 8.7 | 4 | 210,000 |
| 19.4.45 | M | 3.8 | 9.0 | +8¾¼ | 32,000 |
| 5.6.45 | E | 4.8 | 8.8 | 11¼ | 16,000 |
| 23.7.45 | M | 3.6 | 8.5 | 8 | 48,000 |
| 1.10.45 | E | 3.9 | 8.7 | 8½½ | 8,000 |
| 3.12.45 | E | 4.1 | 8.7 | &½½ | 9,000 |
| 17.1.46 | M | 4.0 | 8.2 | 7¼¼ | 34,000 |
| 20.2.46 | M | 3.6 | 8.1 | 9¼¾ | 22,000 |
| 21.3.46 | M | | | 3¾ | 150,000 |
| 22.3.46 | M | | | 6½ | 41,000 |
| 27.3.46 | M | | | 4 | 92,000 |
| 29.3.46 | M | 3.5 | 8.3 | 7 | 20,000 |
| 1.4.46 | M | | | 6½½ | 91,000 |
| 23.4.46 | M | 3.4 | 8.5 | 6½½ | 68,000 |
| 16.5.46 | M | | | 6½¾ | 61,000 |
| 4.7.46 | M | 3.5 | 8.8 | 7¾ | 20,000 |
| 29.8.46 | M | 3.4 | 8.8 | 8 | 28,000 |
| 30.9.46 | M | 3.5 | 8.4 | 8¼ | 11,000 |
| 27.11.46 | M | 3.5 | 8.5 | +6 | 95,000 |
| 10.12.46 | E | 4.8 | 8.8 | 5½ | 97,000 |
| 13.1.47 | E | 4.1 | 9.2 | 9 | 33,000 |

The above is an example of information provided by the Auckland Milk Board.

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