A FARM MANAGEMENT STUDY OF FOUR FARMS SUPPLYING TOWN MILK IN THE PALMERSTON NORTH MILK DISTRICT

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INTRODUCTION

Farm management is concerned with decisions on the individual farms. Farms are complex organizations, each one is unique in many respects. Each uses variable resources, with diverse purposes behind their use. Any farm study dealing with decisions of farm operation should therefore treat farms on an individual and dynamic basis. To achieve this scope a study must use a logical approach to obtain information regarding decisions on resource use.

A study of this type must consider certain broad farm management principles which a farmer considers, either consciously or unconsciously when making decisions. However, before any understanding of how these principles apply, background knowledge of factors which influence how they work must be known. These consist of national and local economic factors, together with physical factors of climate, soil, and topography. An understanding of the specific resources available to an individual farmer and his aims and purposes must also be known. The integration of the principles of farm management with this background provides the basis on which decisions rest, and therefore is fundamentatl, both to the making and understanding of decisions.

An understanding of the basis underlying decisions allows problems in farm management to be understood and discussed. An extension worker who must teach others how to make decisions can not do this job without it. Many problems of the farming industry are concerned with how the individual business reacts to differing circumstances. The purposes of this farm management study are concerned with these matters.

This study covers the management of four town milk suppliers in the Palmerston North Milk District. The thesis includes three chapters dealing respectively with national policies, local conditions, and individual circumstances concerned with resource use. The fourth chapter presents a discussion of the four town milk farms. These farms were amoung co-operating farmers representing different production plans. All phases and details of the farms were not necessarily examined, and the main features only are stressed. The final chapter discusses certain interesting practices encountered during the course of study and show how they are related to the farm programme.

CHAPTER I

NATIONAL ORGANIZATION OF THE TOWN MILK SUPPLY

In New Zealand the liquid milk market is of minor economic importance to the dairy industry, but when the health and well being of the country as a whole is considered, no other food is so important. The New Zealanders are indeed fortunate to have such a nutritious product at such a low price. Their good fortune results from the foresight of their Government in providing a reasonably priced product through subsidy and through the efficient handling and distribution of milk. Certain Acts of Parliment make this possible. New Zealand also is a country of natural grassland which furnishes abundant roughage of high food value which results in low production cost.

The New Zealand Government places a high value on the importance of milk in the national diet and in 1955 provided a subsidy of £2,759,991 for the liquid milk scheme. (See Appendix 1A) The importance of milk for the health and growth of the young and adolescent is also recognized by the Government and as a consequence a school milk scheme was started in 1937 allowing one-half pint of milk per child each day. In 1955 this milk in school scheme cost the Government £525,040. (1)

Town milk production, which accounts for only 9.09 per-cent (2) of the New Zealand dairy production expressed as butterfat is over shadowed in importance by the cheese and butter manufacturing industries. The importance of town milk production in national farm income will increase through an increasing population, the shifting of population to urban districts, (3) and increased consumption of milk per capita.

Table 1 indicates that the percentage of dairy production consumed as

whole milk increased more rapidly than the percentage increase in population. Over the period 1951 to 1955 the percentage increase in population was 9.9, while total milk sales increased by 16.5 per-cent.

TABLE I

POPULATION FIGURES AND TOWN MILK SALES THROUGH THE NATIONAL MILK SCHEME FOR 1951 AND 1955

YEAR	TOTAL MILK SALES* (1)	POPULATION (4)
1951	47,589,947 Gallons	1,970,522
1955	55,429,833 Gallons	2,164,734
Increase between 1951 and 1955	7,839,866 Gallons	194,212
Per-cent of Increase	16.5%	9.9%

*Includes school milk sales.

The present organization of the Town Milk Industry has been accomplished over the last fifteen years. The first major step towards this end was taken in 1943 when a Royal Commission comprised of three persons was appointed to report on the following: (5)

"(a) The present circumstances of the supply of milk to the four metropolitan areas of Auckland, Wellington, Christchurch and Dunedin, and to such other areas as may from time to time be directed by the Minister of Agriculture:

(b) The alteration and reorganization in methods of supply, collection, treatment and distribution that may be necessary to such areas to ensure at reasonable prices, adequate supplies of milk of high standard:

(c) The supply of milk for the Armed Forces, including Allied Forces in such areas."

As a result of the report and reccomendations of this commission, the

Milk Act, 1944 was passed. In 1947, 1951 and 1953 amendments to this main Act were passed by the legislature. The Act and its amendments will now be examined as they are the statutory foundation, of the organization.

MILK ACT, 1944 (6)

The purpose of the Milk Act, 1944 was to provide a basis for the marketing of milk and to ensure an adequate supply of milk to meet the countrys demand. To accomplish this purpose the Act provided for the organization of local Milk Authorities, Producer Associations, and a Central Milk Council. The Marketing Department was charged with administring the Act.

Local Milk Authorities

Under the Milk Act, 1944 the country was divided into Milk Districts. For each Milk District there was a local Milk Authority. The authority was either a borough council, which appointed a milk committee to handle the milk affairs of the district; or a metropolitan milk board. The principal function of these authorities were to ensure that the inhabitants of the districts were provided with an adequate supply of milk of a standard not less than that laid down in the Food and Drugs Act, 1908. The Act gave each Milk Authority the following powers:

(a) To buy and sell milk, to treat milk, and to provide for the storage in cool chambers of milk and milk products:

(b) To plan and promote if practicable, improved methods of producing, collection, treating, carrying, delivering, and distributing milk.

(c) To regulate and control exclusively, subject to provisions relating to recognised organizations of milk producers, the supply and distribution of milk within the district:

(d) To form and promote, as far as may be practicable, means to prevent and eliminate wasteful, unnecessary, or unhygenic agencies, collection, treatment, carriage, delivery, distribution, and sale of milk; including methods of payment for milk which prevents the contraction of bad debts:

(e) To promote economy of distribution through the consolidation or zoning of milk rounds:

(f) To see that an adequate supply of milk of good quality is available for the inhabitants of the district:

(g) To obtain land, buildings, or plant and maintain and operate such assets for the supply, transport, treatment, cool storage or distribution of milk and cream:

(h) To be able to borrow money to carry out functions set forth under the act, under the Milk Amendment Act, 1947: (7)

(i) To obtain shares in any company formed for the treatment of milk.

All milk vendors were controlled by a licensing system issued by the Milk Authority. A license was also required from the Milk Authority for the treatment or storage of milk intended for human consumption in the district of the authority.

The Producer Associations

The Act made provision for Producer Associations to supply the milk required for each milk district. The usual practice was to allow only one producer association in each district but where one association was unable to supply the demand, further associations were formed. If more than one producer association was supplying a district, the producer associations formed a Committee of Supply, which was authorized as the Supply Association for the district. The producer associations act as the agents of the town milk producing farmers. They contract with the Marketing Department (now the New Zealand Milk Board) for the supply of the district. Each local

producers' association is a member of the Town Milk Producers' Federation of New Zealand which was formed in 1945. (8) The main object of this organization is to ensure a fair price to the producers for their milk, and to represent them in all national matters concerned with their welfare. This association is accepted by the Government as a negoiating body on a national basis. Through this national organization, the town milk producers also have representation on the New Zealand Milk Board, the Dairy Industry Council of the New Zealand Dairy Board, and the Standards Institute of the Department of Industries and Commerce.

Central Milk Council and Milk Marketing Division of the Marketing Department

The Central Milk Council was deemed by the Act to oversee the general organization of the town milk industry and to function in an advisory capacity on all town milk problems. The council consisted of the following members:

(a) The Minister of Health, who acted as chairman:

(b) The Director of Milk Marketing:

(c) One person to be selected from a panel of not less than three persons nominated by the Municipal Association of New Zealand:

(d) Two persons, one being resident in the South Island, nominated by some organization or organizations of persons engaged in the production of milk for human consumption and appointed on the reccomendation of the Minister of Agriculture:

(e) Two other persons, one of whom shall be a woman deemed to be of the interest of women and children; who shall be appointed by the Minister of Health.

The Act also provided for the formation of a Milk Marketing Division of the Marketing Department. This division was charged with administering the Act under the Central Milk Council.

MILK AMENDMENT ACT, 1951 (9)

The Milk Amendment Act, 1951 represented the first major change in the industry since the principal Act of 1944. The change was necessary to give affect to the policy of the new Government which took office in 1949, and to rendor more power to the Central Milk Council. Through this amendment the Central Milk Council became a body corporate. Prior to this time, it had been mainly an advisory body to the Minister of Marketing. The Council was reorganized and now consisted of seven members. These include the chairman: a representative of the Municipal Association of New Zealand; three persons representing the Town Milk Producers' Federation of New Zealand; being one person from each of the following areas; (a) Auckland; (b) Taranaki, Hawkes Bay and Wellington; and (c) South Island: a representative of the Dominion Federation of Milk Vendors Incorporated: and one person representing the interest of women and children, appointed on the reccomendation of the Minister of Health.

The main functions and powers of the council set forth by the amendment are as follows:

(a) To promote and organize such things as to carry out the councils objectives which are the provision of adequate supply of milk of good quality for human consumption and the organization of the production, treatment, and distribution of milk on economic basis.

(b) Insure efficiency in the production, supply collection, treatment, storage, distribution, carriage, delivery and sale of milk.

(c) To make reccomendations to the Government as to the prices at which and the margins within which, milk may be bought or sold; as to the rates of allowances to be made in respect of the collection, treatment, storage, distribution, and sale of milk; and as to the conditions subject to which milk shall be sold.

(d) To guide and supervise the activities of Milk Authorities.

(e) To publish reports and investigations relating to milk.

(f) To devise and promote improved methods.

(g) To make reccomendations to the Government as to the constitution, union, or abolition of milk districts, Milk Authorities and the standards of milk.

(h) Provide for licensing of milk producers, milk vendors, and persons engaged in milk treatment.

As shown by the preceding, the Central Milk Council was to make reccomendations to the Government as to the prices, margins, allowances etc. The Governor General, by Order in Council proclaimed the following from the Central Milk Council reccomendations:

(a) Fix the prices at which milk produced or sold for human consumption may be bought or sold.

(b) Fix margins, whether as maximum prices or minimum prices, or by reference to the amounts or percentages by which selling prices may exceed buying prices, within which such milk as afore said may be bought or sold.

(c) Fix rates of allowances to be made in respect of the collection, treatment, storage, distribution and sale of such milk as afore said.

(d) Prescribe conditions subject to which sales of such milk as afore said may be made.

The local authorities, with the prior consent of the Central Milk Council, could operate and maintain a plant for the treatment of milk and in that connection; carry on the business of a dealer in milk with accompanying incidental operations. A great deal of the power of the local Milk Authorities was shifted to the Central Milk Council.

The Marketing Department was to continue to administer the National Milk Scheme, the operation of which was still outside the function of the Central Milk Council.

MILK AMENDMENT ACT, 1953 (10)

In 1952 the Government decided to abolish the Marketing Department and a further rearrangement of the administration of the town milk industry became necessary. The Milk Amendment Act, 1953 was passed to deal with this problem. This legislation abolished the Central Milk Council and a new body, the New Zealand Milk Board, was organized and took over its functions. The new board also took over the administration of the Acts. The main functions of the New Zealand Milk Board were as follows:

(a) Operates the National Milk Schemes, which is one of guaranteed town milk supply, guaranteed producers prices, and fixed margins for services. If the producers price, plus hauling, treating, and distribution margins are not recouped by consumers price, the difference is paid out of subsidy. The board makes these payments and claims rembursements from the Government (Appendix 1A illustrates the 1954 margins and subsidy payments for town milk).

(b) Has the responsibility of making all contracts and other arrangements for supply and the assessment of cost and allowances.

(c) Supervise the Milk in Schools Scheme, including the making of all financial arrangements for getting the milk to schools, and the payment of all contractors.

(d) To operate all government-owned treatment stations which had been operated previously by the Marketing Department. The Board operates these stations as agents for the Government.

In giving the above responsibilities to the New Zealand Milk Board the Government has imposed the following safe guards in the control of the National Milk Scheme: (11)

"(a) Government retained the right to fix the town milk producer price by direct negotiation with the Town Milk Producers' Federation, but after consulting with the Board.

(b) Other national margins or allowances were to fixed by the Government on the reccomendations of the Board.

(c) A limit was placed upon the extent to which the Board could authorise special variations of margins or special allowances needed to cover cost in particular circumstances."

The New Zealand Milk Board consists of eight members. Seven members are the same as under the Central Milk Council previously described and the additional member is a Government representative. Other persons authorised to attend meetings without voting privileges are (a) a representative of the Health Department, (b) a representative of the Dairy Division of Department of Agriculture, and (c) a representative of the Department of Agriculture.

The main function of the local Milk Authorities under the 1953 Milk Amendment Act is to supervise the distribution of milk from the treatment stations. The local Milk Authorities have charge of licensing treatment stations, milk vendors and milk shops. Through these licensing powers they ensure the consumer of a safe wholesome product.

The New Zealand Milk Board (12) has appointed a complete secretariat, staffed with officers from the milk marketing division of the government department previously charged with the administration of the National Milk Scheme. The headquarters of the New Zealand Milk Board are in Wellington with regional offices located in Auckland, Palmerston North, Wellington, Christchurch and Dunedin. Through these regional offices the needs for the particular districts are formulated and subsidy payments are handled. The regional officer in each area has the responsibility to see that an adequate supply of milk is available to meet the demands of that district.

In estimating the needs for a district, he is guided by the demand of the previous year and by population trends. The regional officer then contracts with the local supply association for the so called Nominated Daily Quota necessary to fulfill the demands of the district. The supply association receives the National Milk Price for this nominated quanity. The National Milk Price is also paid for an additional seventeen per-cent of the daily supply for the five spring and summer months, ten per-cent for the three autumn months, and the four winter months. Payment on these additional quantities are an incentive to the associations to meet the quotas and to cope with daily fluctuations of demand.

The allocation of nominated quotas to the local producer associations is a duty of the New Zealand Milk Board; but the fixation of the National Town Milk Price is done by the Government after having consulted with the Milk Board. Prior to 1953 the Town Milk Producers' Federation conducted all its negotiations concerning the price, directly with the Government. In 1955, however, the Government requested the Federation to submit its claims through the Milk Board. The Board was to examine the claims and report to the Government any reccomendations as to possible changes in the price.

THE NATIONAL MILK PRICE

The town milk producer has enjoyed a price guarantee for his product as has the producer of milk for cheese and butter. In the last two cases the prices have been part of a Government scheme aimed to guarantee a cost of production return to average efficient producers supplying average efficient factories.

Because the supply of milk for liquid consumption is comparable to milk supplied for cheese manufacture, in that whole milk is forwarded off the farm; the guaranteed price payable to cheese suppliers has been the basis for town milk price. Various differentials supposedly representing differences in production standards between cheese and town milk systems are used to arrive at the Town Milk Price. These differentials are as follows: (5)

1. Carrying capacity and production per cow. The cheese milk price is based on the cost of producing 12,000 pounds of butterfat from 48 cows. The carrying capacity of a comparable town milk supply farm has been reduced to 40 cows. This reduction is necessary because of the additional difficulties met in the production of feed for winter milk. The out of season calving is also believed to reduce the production of the town supply herds by 10 per-cent. With factory supply, the per cow production is figured as 250 pounds of butterfat; so a decrease of 10 per-cent reduces butterfat production to 225 pounds. With animals producing milk with 4.3% butterfat test, this would give a production of approximately 500 gallons per animal per year or a total production of 20,000 gallons of milk for a 40 cow herd.

2. Labour Two full time labour units are allowed in the cost formula for the cheese supplying farm. It is considered however, that the production of 20,000 gallons of city milk has a greater labour requirement than has 12,000 pounds of butterfat. This is because of the greater feeding problems and the necessity for milking 365 days in the year. An additional £200.1.5 over the cost of labour surmised for factory production is granted to the town producer.

3. Work and Maintenance Cost An additional .625 pence per gallon has been added for work and maintenance allowance.

4. Capital The guaranteed price cost formula assumes a capitalization of £75 per cow on a factory supply farm, giving a total value of £3600. The town milk producer being located nearer town, usually has a higher land value and also a larger investment for farm equipment, including dairy and possible feeding sheds, milking sheds, cooling equipment etc. The capitalization is assumed to be £110 per cow, for a 40 cow farm, giving a total value of £4400. Interest at 4½ per-cent is allowed on the additional capital of £800.

5. Cost of Winter Feeding In some districts, extra compensation for additional winter feeding cost is given. This is mainly for South Island centres.

In Appendix 1B, the 1955/56 town milk price is given as an example illustrating the computation of National Milk Price. (12) An allowance for whey, which the cheese factory suppliers can obtain for pig rearing, and a further additional sum representing the difference between the actual payout and the estimated basic payout for five cheese districts in the previous year are added to the basic cheese payout. Any other allowances announced during the year by the New Zealand Dairy Products Marketing Commission to be paid to cheese producers are also paid to the town milk suppliers.

The formula used to calculate the National Milk Price represents an attempt to assess a premium for the additional inputs associated with town milk production compared with factory supply farms. The price is an endeavor to make the return from town milk production sufficiently attractive to bring forth adequate amounts of milk to meet the consumers demand.

The cost of milk production varies throughout the year. To supply an incentive for town milk farmers to produce milk during the difficult periods, higher prices are paid at such times. To obtain these differential payments throughout the year, the autumn months; February, March and April, are given a price somewhere near the National Milk Price; the five spring months; September, October, November, December and January, are assessed a price below the standard price deemed fair for the period; and the four winter months; May, June, July and August, receive the highest price.

Although these seasonal variations are established on a national basis, they may be varied to suit climatic conditions in certain parts of the two islands. The seasonal differential payments as shown in

Appendix 1C (12) are paid by the New Zealand Milk Board to all milk producer associations on their production up to their nominated quota plus 17 per-cent in the spring and summer, 10 per-cent in the autumn and winter months.

Where winter milk production is difficult due to climatic conditions, as in the South Island and in certain parts of the North Island, special winter feed allowances are payable to the producers concerned.

QUALITY CONTROL

Though the New Zealand Milk Board is charged with the responsibility of ensuring a good quality milk, it does not operate inspectional services. All town milk producers must be registered by the Department of Agriculture in terms of the Dairy (Milk-Supply) Regulations 1939. (13) These regulations call for a certain standard of sanitation and shed construction considered appropriate for the production of milk for town supply.

There are two types of registration (14), (a) conditional or temporary registration, and (b) unconditional registration of dairies. Conditional registration is given when application for unconditional registration has been made, but premises do not completely comply with regulations. By remedying the defects they are able to obtain unconditional registration. Also in times of temporary shortages of milk conditional registrations are given to factory suppliers to furnish milk for town supply. Unconditional registration of dairies is accomplished if the premises comply with the Dairy (Milk-Supply) Regulations 1939. This registration must be renewed every year.

Registration and inspection of dairy premises is carried out by farm dairy instructors under the field supervision of senior dairy instructors

of the Dairy Division of Department of Agriculture. These farm dairy instructors also have the legal power to suspend supplies, cancel licenses and they may require improvements to be carried out on town supply farms. The farms are visited on a routine basis, but if milk fails to meet the quality required by the milk treatment stations, the farm dairy instructor is notified and special visits are made.

The Department of Agriculture also registers milk treatment stations and in conjunction with the Health Department, supervises the working of these stations. In addition the Health Department supervises delivery conditions and are responsible for official sampling under the Sale of Food and Drugs Act, 1908 and amendments and the Food and Drug Regulations, 1946 and amendments. (15) (16) These standards require that milk to be used for human consumption shall contain not less than 3.25 per-cent butterfat and 8.5 per-cent of solids-not-fat, that it shall comply with a minimum 4 hour reductase test, and it shall not contain any added water nor any other added substance.

Data from the first and second annual reports of the New Zealand Milk Board gives an indication of the results of quality tests. The following tabulation shows the treatment stations laboratory test results on incoming

town milk for the years ending August 31, 1954 and 1955. (1) (11)

	Total No. of Samples		No. of Non Complying Samples		Percentage of Non Complying Samples	
	1954	1955	1954	1955	1954	1955
Reductase test for keeping quality	330,204	401,730	7,185	10,100	2.18	2.52
Butterfat test	66,622	55,801	706	574	1.06	1.03
Solids-not-fat test	27,090	33,356	2,467	3,341	9.14	10.02

As stated in the reports, "The results are not necessarily a true average. A tendency for some treatment stations to concentrate upon the incoming milk from certain suppliers inflates the percentage of non complying samples. Figures were not available from certain smaller treatment stations."

The report given above indicates that the largest problem is concerned with solids-not-fat. The low solids-not-fat percentage is primarily caused through the combination of low level of nutrition and low testing Fresian cows. Professor W. Riddet et al (17) have shown that low levels of nutrition cause a definite drop in solids-not-fat percentages. Professor I.L. Campbell et al (18) found a direct relationship between average fat and solids-not-fat percentages based on 495 whole lactation records from 161 cows. On the average, as the fat content rises, the solids-not-fat content also rises. However, because of the variation in solids-not-fat at any fat percentage level, improvement in fat percentage will not always improve solids-not-fat in a small cow population.

An indirect cause of low solids-not-fat is the milk pricing scheme.

This pricing scheme is based on gallons and the only incentive provided is for the production of the maximum volume of milk. Because of this gallonage payment, Fresian cows have become the popular breed. The Fresian popularity in the South Island, the areas in which most of the low solids-not-fat occurs, also arises through the producers believing that they are better suited to the environment of the district. The town producer will therefore not change over to higher testing animals as long as they receive the same payment for milk of low solids-not-fat as for milk of high solids-not-fat; and the law is held at bay.

METHODS USED TO INCREASE QUALITY

Two methods of approach have been used by the New Zealand Milk Board to influence the quality of town milk. The first method used was to pay an additional allowance to town suppliers in the South Island and certain parts of the North Island. This additional payment was to be used in helping the farmers to secure a higher level of feeding during the winter in town supply herds. This was aimed primarily at increasing the solids-not-fat through better herd nutrition. The second method used by the New Zealand Milk Board was the Sub Standard Milk Scheme which was introduced in 1955. It was devised to increase quality through differential payments based on butterfat, sediment and reductase tests. It was thought the solids-not-fat content would be increased by encouraging the production of milk of a higher butterfat content.

The New Zealand Milk Board replaced the Sub Standard Milk Scheme in September 1956 with a further plan based on quality payments. (19) There are to be three grades of milk, first grade, standard grade and second grade. First grade milk is that which passes a six hour reductase test and does not

fall below 3.5% butterfat. Standard grade milk passes a four hour reductase test, but fails to pass the six hour test, and/or which contains 3.25% butterfat, but not 3.5% butterfat. Second grade milk is that which fails to pass a four hour reductase test and/or contains less than 3.25% butterfat. The standard grade will be paid at the basic price rate with first grade receiving .5d more per gallon and second grade receiving .4d less per gallon. In addition, if milk contains excessive sediment the producer association is to pay the individual producer no more than the seasonal prices, less 3d per gallon. Milk which contains added water is to be excluded from an associations' supply, and associations are to pay their suppliers no more than butterfat rates for such milk. A farm chilling allowance has also been reinstated as a national margin. A more detailed explanation of the quality payment system and details of farm chilling arrangements are given in Appendix 1D.

The New Zealand Milk Board (20) feels that these measures provide a first step towards a satisfactory quality payment scheme. The various details are included in the contract with the Supply Associations and no special regulations have been promulgated. Changes can therefore take place readily as more experience is gained. A few problems which have been recognized in the short period this plan has been in operation are as follows: (21)

1. Transport conditions between the farms and the treatment stations might effect the quality test of the milk. The producer therefore is sometimes penalized for conditions which are entirely out of his hands.

2. The New Zealand Milk Board is allowing first grade price to be paid for all milk up to the nominated quota in those districts where treating houses are not located.

3. The producer associations are able to route milk which is not needed to fill the needs of the town supply away from treatment stations and into factories. The producer association is then allowed full first grade price for this milk up to their nominated quota. This allows producer associations to divert milk of suspected low quality to the factories, but still receive first grade price.

The payment system does ensure that keeping quality is recognized and the production of milk with low butterfat is discouraged. At the present time, because of no suitable test for the solids-not-fat content of milk, the most practical method seems to be the type of payment scheme being introduced.

TUBERCULOSIS TESTING IN TOWN MILK SUPPLY HERDS

The quality of milk is important, but it is essential in the town milk trade to have disease free milk. Bovine tuberculosis, the most important milk borne disease, is prevalent in New Zealand dairy herds. It has been estimated that in 1950 the incidence of Bovine tuberculosis for the whole of the Dominion was between 10 and 10.5 per-cent. (22) The percentages vary greatly between districts. In the Nelson district, for example, it was under 1 per-cent, while in parts of the Waikato and Bay of Plenty, it was over 20 per-cent. It has been conclusively shown that heat treatment pasteurization is effective in completely killing tubercule bacilli in milk, but in New Zealand in 1955, only 87 per-cent of the total town milk sold was pastuerized. (11)

The first national tuberculin testing program for eradication of Bovine tuberculosis in dairy cattle producing for town milk supply was set forth in Section 84 of the Statutes Amendment Act 1945. (23) The main

principles of this Act provided that "all cattle for the time being kept in any premises which are used for the purpose of producing milk or cream for human consumption shall from time to time, as the Chief Inspector shall determine, be tested with the tuberculin test under and for the purpose of this section and it has shown a positive reaction to the test it shall be condemned by an inspector, and when it has been destroyed pusuant to the principal Act, the owner thereof shall be entitled to compensation to the extent of three forths of the fair market value ascertained as provided in section 40 of the principal Act; provided that such market value shall in no case exceed £16."

The testing program was commenced in 1950, under the supervision of the Animal Industry Department of Agriculture and testing proceeded until 1954. During this time the town suppliers objected because of the alledged inadequacy of the compensation payable for condemned reactors and also because they considered a special compensation payable for the loss in production between the time the reactor is removed and slaughtered and the time when a replacement is embodied in the herd as a producing animal to be too low. In 1954 a Commission of Inquiry into Tuberculin Testing of Town Milk Supply Herds was appointed by the Governor General. The commission was to report particularly upon the following matters, namely: (23)

"(a) Whether the administration of the present scheme of Tuberculin testing and culling of herds can efficiently eradicate Bovine tuberculosis in town supply herds:

(b) Whether town milk supply producers can maintain production while the herds are being depleted as a result of testing and culling, having regard to the difficulty of providing disease-free replacement stock."

and generally upon such other matters arising during the course of their inquiries, and upon any matters affecting the premises which they considered should be brought to the attention of the Government.

As a result of this investigation, the Stock Amendment Act, 1956 was introduced and passed, and the 1945 amendment was repealed. The main changes have been in the compensation provisions. The compensation for an animal is based on the fair market value at the time of testing. (24) In no case shall the fair market value exceed £28. The actual compensation varies from six-tenths to eight-tenths of the fair market value depending upon the percentage of positive reactors in the herd tested. There is in addition a provision allowing for the first and repeat test to be aggregated for compensation computations under certain circumstances.

The Act also provides for the payment of a loss of production bonus. This payment is payable at the rate of £12 per animal to genuine town milk producers. A more detailed explanation of the complete Act is given in Appendix 1E.

The success of the present plan to eradicate Bovine tuberculosis depends on the ability of the staff of the Animal Industry Division of the Department of Agriculture to operate the testing program effectively, so that complete testing of the town supply herds and replacements is accomplished. If the size of staff proves to be inadequate, as was previously the case, success will be in doubt. It is also apparent that until complete testing of all cows in the Dominion is accomplished, eradication of Bovine tuberculosis in the town supply herds will beslow. Town milk supply herds, which comprise approximately 10 per-cent of the dairy stock of the Dominion,

are scattered amoung farms carrying the remaining 90 per-cent of the dairy stock which are presumed to be infected to the same extent as the town milk herds. (25)

SUMMARY

Before 1944 the town milk supply in certain parts of the Dominion was in a chaotic state. The passing of the 1944 Milk Act, was the first attempt to nationalise and organize the industry. Since then further legislation brought about by experience and policy changes has led to the present national organization, having the New Zealand Milk Board as the operative power.

This Government legislation has not only given the consumer a much improved product, but has given the town producer a stable market, guaranteed price, and a voice, in the national town milk policy through producer associations.

As the adequacy of supply has been met in most parts of New Zealand, more emphasis is now being placed on giving the consumer a more wholesome disease free product. The New Zealand Milk Board has made the first step in this direction by introducing a quality payment scheme. This aims at givingthe consumer a quality product and gives credit to producers who at considerable personal effort preserve the utmost cleanliness on his farm. Although a law has been enacted since 1945, for the testing of Bovine tuberculosis in town supply herds, the eradication has been slow. At the present time, with agreement reached between the town suppliers and Government on compensation, and the organization of a tuberculin testing program, it is likely that better progress will be made.

The national organization, described in this chapter gives a background of National policy and how this policy affects the farmer. In the discussion in the following chapters continual reference to this chapter on National policy will be made.

CHAPTER II

CONDITIONS COMMON TO TOWN MILK PRODUCERS IN THE PALMERSTON NORTH MILK DISTRICT

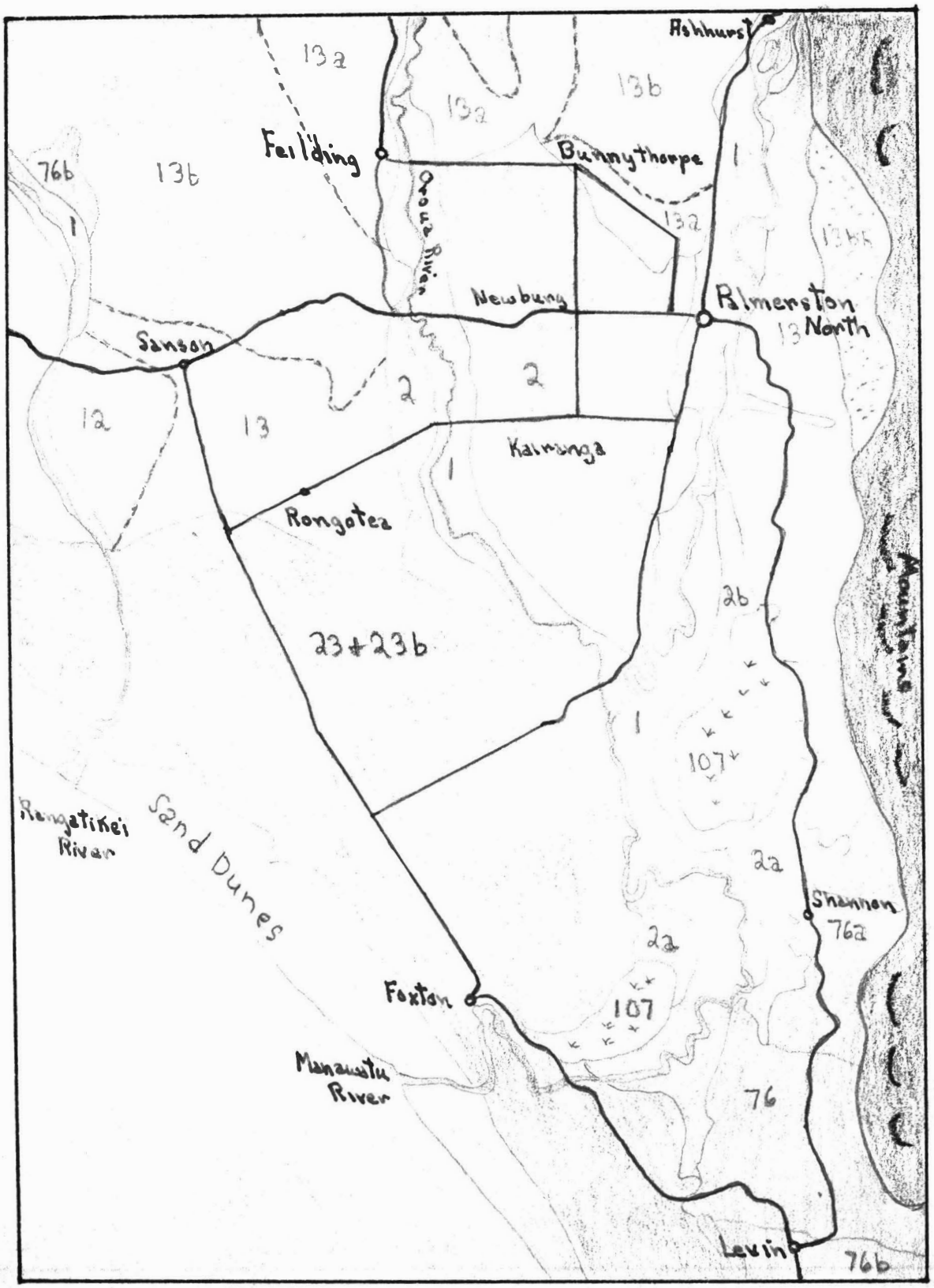
Local conditions common to the town milk producers in the Palmerston North Milk District can be divided into two groups: physical factors; which include topography, soil and climate; and economic, which embrace the policies of the local producer's association, the guaranteed price, and the increasing demand for market milk. These factors, together with their repercussions on the town producers will be discussed in this section. Particular reference will be made to the town milk suppliers of the Palmerston North Milk District, as examples of the Manawatu, but the topography, soils and climate will be discussed for the entire Manawatu.

TOPOGRAPHY

The Manawatu district has as its boundaries (refer to Illustration I) the Rangitikei River on the North the Tasman Sea on thw West and the Tararua-Ruahine ranges on the East and South. The Manawatu plain, as it is commonly referred to, stretches from the Manawatu Gorge near Ashhurst, to the coast. From the gorge to Palmerston North the plain slopes steeply, but between the town and the sea the slope is more gradual with the Manawatu and Oroua Rivers following a winding course across it. The plain is seperated from the sea by a line of both loose sand dunes and rolling sand hills covered with vegetation.

The Oroua and the Manawatu Rivers have formed a flat river valley which has its widest point between Palmerston North and Fielding and then narrows as the rivers meet. On each side of this valley and above Palmerston North and Fielding the country is rolling hills and terrace land. The

SOIL MAP OF THE MANAWATU



Recent Soils

Organic Soils

Yellow-grey Earths

Yellow-brown Sands

Yellow-brown Loams

Refer to Appendix 2A for description of soils.

topography of the Manawatu district and the soil types are related in that any change in topography generally leads to a change in the soil type.

SOILS IN THE MANAWATU

The soils of the Manawatu district fall into four major genetic soil groups. (26) These groups are (a) the Recent group; (b) Yellow-grey earths and specifically those in the "transition to podzolic soil series"; (c) Yellow-brown sands; and (d) Yellow-brown loams of the Takapau suite. There is also a small group of organic soils of mellow peaty loam. The location of these groups are shown in Illustration I, "The Soil Map of the Manawatu". Appendix 2A outlines a general description of the soils in the district.

The majority of the recent soils of the district have been laid down by the Oroua and Manawatu Rivers. These soils, in the main, are deep brown, mellow loams with high fertility. The two main soil sets under this group are the Manawatu loam and the Kairanga silt and clay loam. The Manawatu loams are river flats with high natural fertility and fairly good natural drainage; but subject to flooding. The Kairanga silt and clay loam are also river flats, but of a heavier type mottled grey. They tend to become very wet through winter because they are low lying and slow draining. There is also a further Kairanga soil which is gleyed and in an area subject to much flooding. Other small areas of the recent soils in the Manawatu consist of those which are peaty in nature, located on fertile hummocky flats and small areas of sand and gravel along the rivers.

The yellow grey earths, with specific reference to "transition to podsolic soil series", consist of a weak structured topsoil and a yellowish

nutty subsoil finely flecked brown or grey, with an incipient pan formation. After heavy rain the water percolates rapidly through the upper part and collects on the impervous layer, making this soil well suited to mole draining, except for the very flat country where difficulty in moving drainage water away is encountered. These soils border the river flats and consist of undulating terraces, to rolling hill country.

The yellow-brown sands are located in the rolling country along the coast, directly behind the loose sand dunes. They are young soils, fixed by vegetation and derived from aeolian sand. The subsoil is very loose and the land is subject to drought, except in valleys where ground water approaches the surface. The land is subject to wind erosion and needs planting and shelter.

The yellow brown loams are derived from fine textured volcanic ash and greywacke. These soils are of medium natural fertility, consisting of a dark brown silt loam on a yellow brown heavy silt loam. The drainage of the soil varies from good natural drainage for the stony belt around Levin to fair subsoil drainage around Shannon.

The two small areas of organic soils are a highly fertile black peaty loam. These areas are swampy, but are being reclaimed by the use of large open drains.

The town milk producers supplying the Palmerston North district are grouped generally in five localities. A large group farm the Manawatu loam soils near the Manawatu River, between Ashurst and Palmerston North. Another group are along the Oroua River near Fielding on both Manawatu loam and Kairanga silt and clay loam. A third group is situated on Kairanga

silt and clay loam in a vicinity about half-way between Palmerston North and Fielding, in the Newbury district. A further group is located in the Kairanga community between Rongotea and Longburn on Kairanga silt and clay loam. There are also a few producers near Bulls on the heavy yellow grey loam soils.

The producers located on the Manawatu soil set have a distinct advantage for winter milk production because it is free draining and highly fertile. This type of soil is ideal for town milk production. These farmers frequently have a runoff for dry animals and young stock on less expensive land, thereby using the soil entirely for milk production.

Of the town suppliers located on the Kairanga silt and clay loam, a majority have their land drained or are in the process of draining it. If this land is not drained, particularly the strongly gleyed type, it becomes very wet in the winter and difficulty in obtaining proper utilization of winter pasture is encountered. Extensive pugging by the dairy animals also takes place. With draining, the land becomes very productive and though pugging is not as great a problem, it still occurs.

The few producers located on the heavy, yellow grey earths, specifically in the Ohakea loam have very wet soil conditions to contend with over the winter months. Utilization of winter pasture by the grazing cow is impossible without extensive pugging. Draining does help, but pugging is still a major problem. These soils also tend to dry out in the summer.

The soil type is a large contributing influence in dictating where town milk production farms are located in the Palmerston North district. They relate to a large degree the ease with which the farming operation is

performed and the severity of the problems associated with winter milking. although some town milk farms are located on the more heavy and poorly drained soils, the majority are situated on the lighter free draining soil which is better adapted for town milk production.

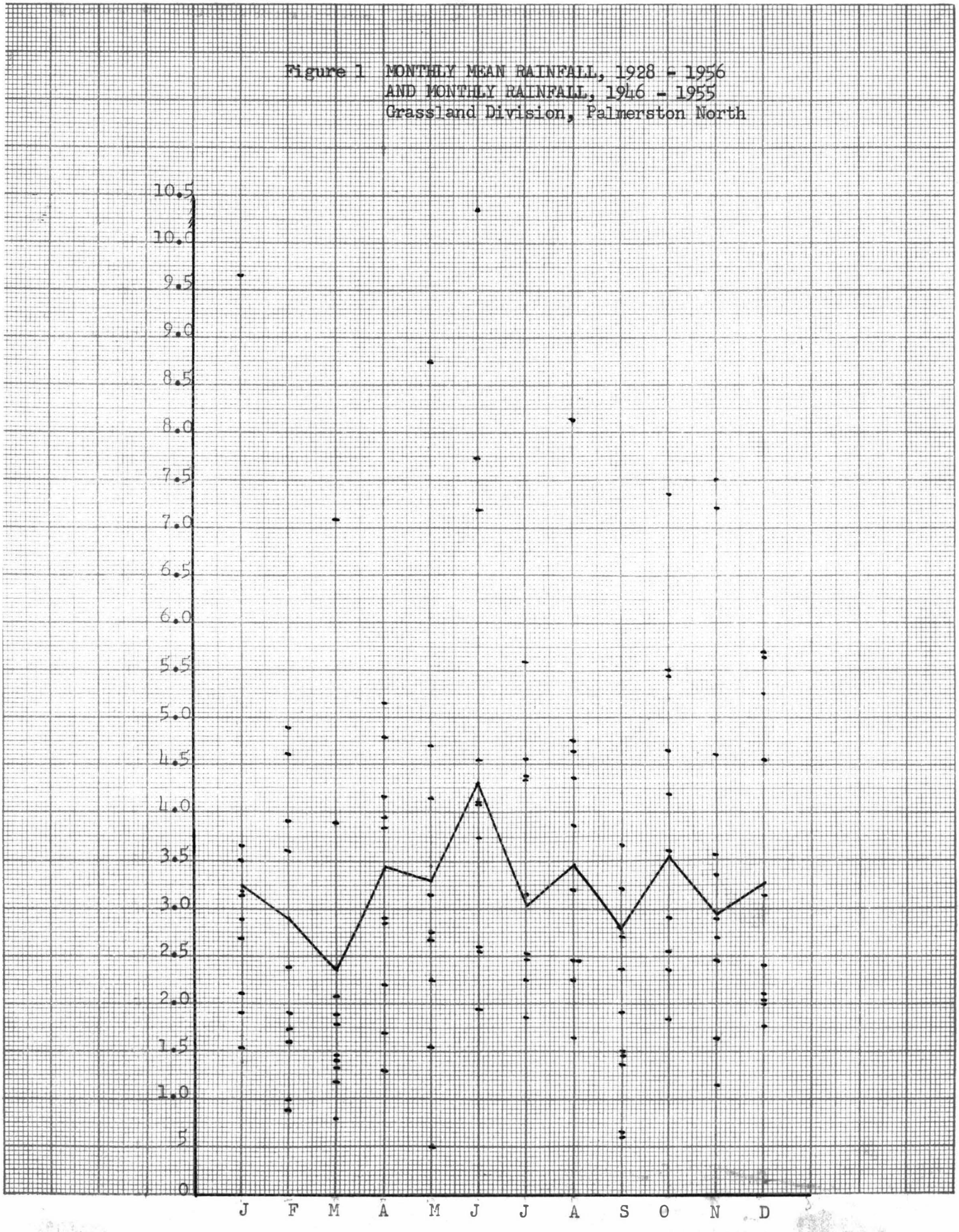
CLIMATE OF THE MANAWATU

The climate is an important factor influencing the type of farming practiced. In the Manawatu the even yearly rainfall, together with cool to mild temperatures make grassland farming the predominating type. The rainfall fluctuates consderably, but because of the surrounding ocean, temperatures do not vary to any large extent.

The climate of the Manawatu district is influenced by two physical factors, the prevailing westerly and northwesterly winds, and the Tararua-Ruahine ranges. The westerly and northwesterly winds arrive at the Western coast fully laden with moisture, and contact land along the Southern Alps in the South Island, and Mount Egmont in Taranaki. By the time the winds have reached the Manawatu area, they have frequently lost a considerable amount of their moisture. The Tararua-Ruahine ranges, which lie at about right angles to the prevailing winds, force the winds upward, causing the deposition of rain over the district. A pattern is formed, with the land near the mountains receiving the most rain and that nearer the coast having a lower average rainfall.

The meteorlogical records for rainfall taken at various locations in the Manawatu area illustrates this pattern. (27) The total yearly rainfall for these locations are as follows: Palmerston North 39 inches, Fielding 36.5 inches and Ohakea 35 inches. These points show a well defined rainfall

Figure 1 MONTHLY MEAN RAINFALL, 1928 - 1956
AND MONTHLY RAINFALL, 1946 - 1955
Grassland Division, Palmerston North



decline as you move from the mountains to the sea. Further South, Levin, which is near high mountains has a rainfall of 34 inches, whereas Foxton, which is eleven miles distance from the mountains has but 33.5 inches of rain.

A general comparative classification of climate has been made by B.J. Garnier. (28) This classification indicates the Manawatu winters as "wet and cool", the spring, as "wet and warm", and the summers as "moist and warm". In comparison with the rest of the North Island during the summer and autumn, the temperature is typical of the whole of the Island, but the comparative dryness of the summer and autumn months leads to the further classification of the Manawatu as an area of slight moisture deficiency. In years when rainfall is below normal, there may be actual depletion by plants of water reserves in the soil, but the severity of depletion will depend on other environmental factors such as temperature, wind velocity, ground cover and soil type.

The meteorlogical record used in the following description of climate were obtained from Grassland Division, Palmerston North. They are precise records gathered over a 28 year period from March 1928 to April 1956. (29) The data therefore applies specifically to the Palmerston North District, but the general climatic pattern also applies to the Manawatu area.

Rainfall Distribution

The Palmerston North district receives an average rainfall of approximately 38 inches. Figure 1 showing the monthly mean rainfall also illustrates the rainfall to be fairly well distributed over the year but has wide fluctuations between years for the same period.

Even though the rainfall appears to be evenly distributed, there are

periods of moisture deficiency in the district as previously described by Garnier.

In determining the months in which moisture deficiency most generally causes plant growth to suffer, it was found that forty per-cent of the time February received two inches or less of rainfall. Similarly March was below two inches fifty seven per-cent of the time. R.H. Schwass, Massey College, (30) using Bondys[1] analysis of drought, analysed the Grassland data from March 1928 to July 1956 and found the following.

Season	Total No. of Days	Absolute Drought*		Dry Spell*		Partial Drought*	
		No. Days	%	No. Days	%	No. Days	%
Spring Sept. - Nov.	2548	26	1.0	73	2.9	33	1.3
Summer Dec. - Feb.	2527	103	4.1	160	6.3	78	3.1
Autumn March - May	2668	70	2.6	178	6.7	147	5.5
Winter June - Aug.	2637	27	1.0	79	3.0	70	2.7

*No. of days of each category falling within the periods specified.

These figures show that absolute drought has occured most often in summer. Dry spells are most numerous in summer and autumn and partial droughts occur most frequently in the autumn.

These figures, however, do not consider temperature, wind, relative humidity and rainfall during the preceding interval and these factors all

[1]An analysis of droughts in New Zealand reported by F. Bondy, NZJST, 32B, (2) 1-10 defined three types of "Droughts" as follows:
Absolute Drought - is at least 15 consecutive days to none of which is credited 0.01 or more of rain.
Dry Spell - is at least 15 consecutive days to none of which is credited 0.04 or more of rain.
Partial Drought - is at least 29 consecutive days during which the mean daily rainfall does not exceed 0.01 per day.

TABLE II

MEAN AIR TEMPERATURE AND MINIMUM GRASS TEMPERATURE

Month	Mean Air Temperature			Minimum Grass Temperature		
	High	Mean	Low	High	Mean	Low
January	67.1	62.5	57.6	55.1	47.5	42.9
February	69.3	62.6	54.7	54.1	47.5	41.3
March	65.4	60.7	57.3	48.9	44.3	36.8
April	63.1	57.0	52.2	51.1	43.8	33.1
May	54.8	51.0	47.9	40.9	36.9	30.1
June	50.3	47.1	44.2	50.3	33.5	44.2
July	49.9	46.1	41.8	38.2	32.3	26.9
August	50.3	47.7	42.4	38.1	33.5	28.6
September	52.5	50.4	45.6	41.0	36.7	33.0
October	57.5	53.9	49.4	45.2	40.3	33.6
November	60.0	56.8	49.4	49.0	43.5	38.7
December	66.6	60.6	55.9	52.5	52.1	41.2

influence the severity of the drought.

Excessive rainfall can also be detrimental to the town milk producer. In determining the months in which excessive rainfall might be detrimental in the Palmerston North district, it was found that the month of June had 4 inches or more of rain fifty two per-cent of the time, the corresponding figure for July being forty one per-cent and August twenty five per-cent. In addition, June had 6 inches or more of rain twenty five per-cent of the time. These facts together with the slow evaporation results from low temperatures and wind velocities in the winter months makes the soils which are not free draining very liable to pugging. Under these circumstances utilization of pasture is difficult. This is especially important on town milk farms where winter pasture is very important in the feeding programme.

Temperature

The average mean air temperature and the average minimum grass temperature are shown in Table II. These data show a definite temperature curve with the months of January and February being the warmest with average means of 62.5 degrees and June, July and August being the coolest with an approximate average mean temperature of 47 degrees.

Temperatures in excess of 80°F. are very rare in the Manawatu district, but temperatures slightly below freezing are quite common. This is illustrated by the minimum grass temperature curve. The month with the lowest minimum grass temperature is July with 32.5 degrees. The average minimum grass temperature was 32 degrees or below thirty two per-cent of the time in June, forty seven per-cent in July and twenty five per-cent in August. The actual lowest monthly mean grass temperature recorded was 26.9 degrees.

The mean air temperatures in summer and autumn are very mild. This is illustrated by the highest mean monthly air temperature recorded was 69.3 degrees. The temperature at the soil surface, however, may be entirely different than the temperature measured at four feet above ground level, which is the height used for meteorlogical readings. Dr. K.J. Mitchell, Grassland Division (31) on a day with maximum air temperature of 77.5, found the following temperatures at different soil depths, soil cover and pasture heights.

TABLE III

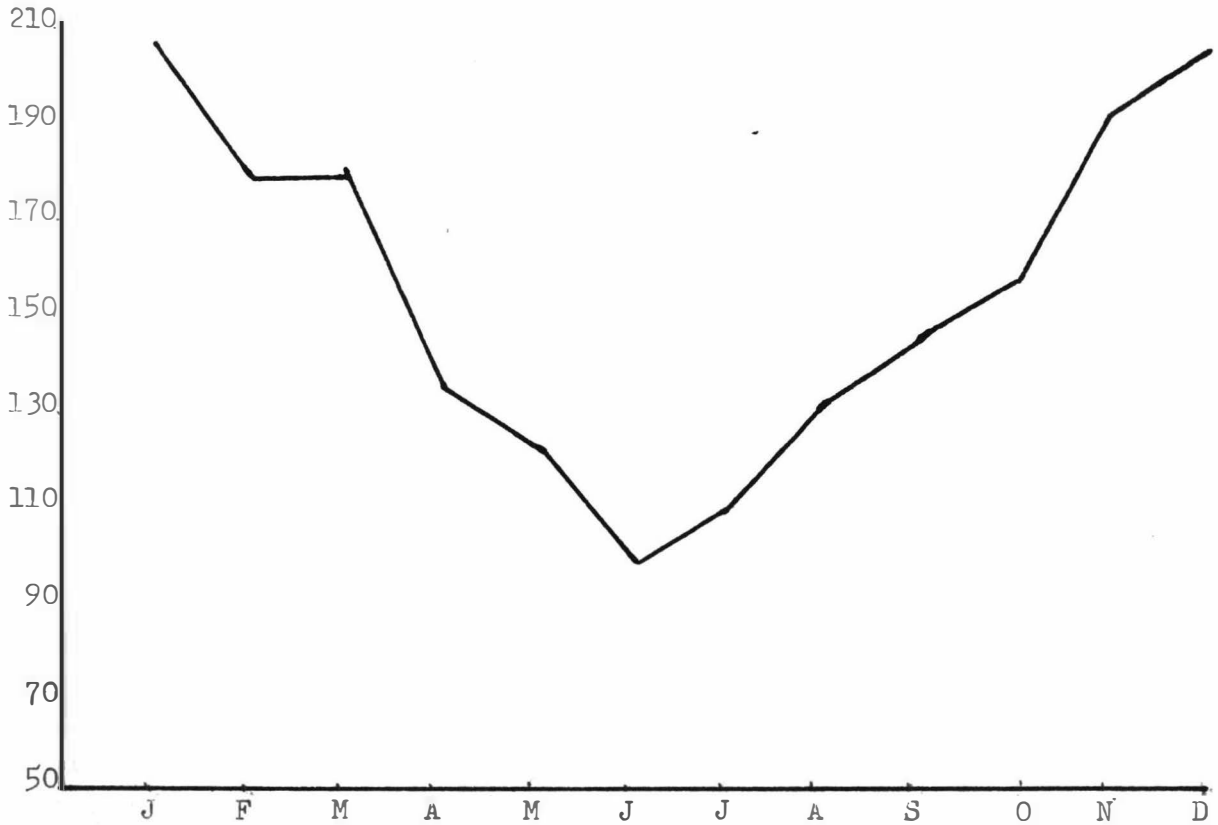
SOIL TEMPERATURES 2 P.M. 28/1/54
GRASSLAND DIVISION

	Sandy Loam		Silt Loam	
Depth	Sparse Pasture	3 in. Pasture	3/4 in. Pasture	4 in. Pasture
¼ in.	118.5	88.5	92.0	77.5
3 in.	90.5	73.0	77.5	67.0

With little pasture cover the soil temperature at ¼ inch below the surface on a sandy loam was 118.5 degrees, and even at the 3 inch depth 90.5 degrees was registered. With a 3 inch pasture cover the temperature of the soil at a depth of ¼ inch was 30 degrees less than was the case with sparse pasture cover. The silt loam pasture, both under 3/4 inch pasture cover and 4 inch pasture cover were 10 to 25 degrees lower than was the case with the sandy loam.

Therefore because meristematic centres, at which the greatest part of the herbage is initially formed, are within ½ inch of the soil surface, excessive soil temperatures detrimental to plant growth can occur.

Figure 2 MEAN HOURS OF SUNSHINE PER MONTH, 1928 - 1956
Grassland Division, Palmerston North



The time at which spring growth occurs is important to the dairy farmer and is largely determined by the temperature and light. September is the month in which a flush of spring growth usually takes place; but the data shows that September has a minimum grass temperature of 36°F. or less twenty five per-cent of the time and a mean air temperature of 50 degrees or less forty per-cent of the time. It appears that at temperatures of 50 degrees or less little grass growth will occur in most of the pasture species used in this area.

The climatic response of different pasture species varies, however, K.J. Mitchell states (31) that the temperature for optimum growth of the individual tiller is about 60 degrees or less for the european grasses i.e. the ryegrasses, cocksfoot, and yorkshire fog. There is however, a considerable range of temperatures over which the changes in rate of growth of these individual grasses are comparatively small.

Other Climatic Factors

Moisture and temperature are not the only controlling climatic factors influencing plant growth. Brougham (32) has shown that light interception by the leaves of pasture plants is a feature of major importance in plant growth. As length of day and light intensity decrease towards winter, the total light available decreases greatly, and this lowering of the amount of light intercepted and reduces plant growth. An indication of the amount of light available is shown in Figure 2 illustrating monthly hours of sunshine at Palmerston North. The hours of sunshine have a distinct curve with a decline from a high level in January of 206 hours to a low level in June of 97 hours. Management of pasture for complete light

interception is very important to obtain maximum growth.

Other climatic factors such as relative humidity; which declines from a high level in June of 84.4 per-cent to a low level in January of 71.9 per-cent and the mean 24 hourly wind run in miles, which declines from a high level of 167 miles in January to a low level of 116 miles in June are shown in graphical form in Appendix 2B.

It may be concluded that in the Palmerston North district, temperature and amount of light available are the two main limiting factors in winter pasture growth, but the degree of limitation is dependent on other environmental factors, i.e. plant species, fertility, moisture, and degree of defoliation. The primary limiting factor in the summer and autumn appears to be moisture availability, but excessive temperatures might also play a role on pastures growing on sandy soil types where there is little plant cover. Rainfall of excessive amounts leading to pugging and inefficient use of winter pasture is also a particular problem to the town milk supplier.

COMMON ECONOMIC FACTORS

There are certain economic factors which are common to all farmers in the Manawatu Producer's Association. These factors are (a) certain policies of the Manawatu Producer's Association (33) (b) a guaranteed price for their milk and (c) a constant increasing demand for milk.

The Manawatu Producer's Association officially known as the Manawatu Co-operative Milk Producer's Company Limited, is a duly incorporated company with a managing secretary and board of directors consisting of seven members. Each town milk supplier in the Palmerston North district is a member of

this company, and contracts each year with the company to supply a given quota of milk. The agreement between the producers and company is made annually. In addition to the quota, it covers the advance price for quota milk, methods of payment, and the duties of the producers in supplying milk. A copy of the 1955 agreement is shown in Appendix 2C.

The producer's association partially governs the gallonage of the contract and therefore the proportion of farm output supplied as town milk. The policy of the association is to ensure fulfillment of its own quota with the New Zealand Milk Board and to secure the best price possible for all the producer's milk.

To insure that quota contracts are met, the association (a) enforces penalties on producers who fall below their alloted quota at the rate of three pence per gallon for each gallon short supplied up to and including twenty per-cent of the quota gallonage and four pence per gallon for every gallon short supplied if over twenty per-cent of the gallonage quota; (b) sets the producers quotas for the following year on the basis of the average of the lowest winter months production, (c) pays practically full town milk prices for surplus milk produced in the four winter months; and (d) at the present time, does not reduce the quota of those producers which drop below their alloted quota in late summer, but produce a surplus above quota in the winter months. These points together with the seasonal price differential provide the incentive to producers to maintain their quotas. Even with the incentive for a even production, Table IV illustrates that the milk produced in the Manawatu Producer's Association is really seasonal in distribution. The table shows that the three highest production

months, October, November and December, are usually twice as high as the lowest months, which are March, April, May and June. Even with the seasonal trend in production, however the association has never fallen below the nominated quota.

TABLE IV

THE PERCENTAGE OF THE TOTAL MILK PRODUCED IN EACH MONTH OF 1954 AND 1955 IN THE MANAWATU PRODUCER'S ASSOCIATION (33)

Month	1954	1955
January	9.2%	8.7%
February	7.0%	5.9%
March	6.1%	6.3%
April	6.0%	6.0%
May	6.3%	5.9%
June	6.1%	6.1%
July	6.5%	6.5%
August	8.0%	7.7%
September	10.0%	10.1%
October	12.1%	12.5%
November	11.7%	12.5%
December	11.0%	11.8%
	100.0%	100.0%

It has been shown previously in Chapter I that the price for town milk is guaranteed and is the subject of annual negotiations between the Town Milk Producers' Federation and the Government. The town milk producers are therefore operating under condition of certainty, in so far as his price for one year is concerned.

The producer associations receives the standard guranteed price for the alloted quota plus 17 per-cent in summer and spring, and 10 per-cent for winter and autumn, but it is received in the form of differential seasonal prices. The association then advances to the producers payments based on a price generally .5d below the seasonal national price. The .5d is witheld

to meet management expenses.

The price paid for surplus milk over quota depends on the price the producer association is able to obtain from selling the milk for the production of either butter, cheese or casein. Butterfat rates are paid for surplus in the autumn, spring and summer, and gallonage rates are paid in the winter. Gallonage rates are paid at this time because a milk shortage generally causes most of the milk to be sold in the liquid milk trade.

Certain methods are used by the producer associations to obtain the highest return possible for all milk sold. A few of these are as follows: (33)

1. Require those producers who are near manufacturing companies which purchase surplus milk, to send their milk to these companies at times of high surplus.
2. Sell the milk from higher testing herds as surplus and leave the milk from lower testing herds for town supply.
3. Zone the supply to reduce transportation cost.
4. Control a large quanity of milk to have bargining power with the companies which wish to purchase the milk.

The Manawatu Producer's Association, was able to pay 44.5d per pound of butterfat in 1954, 43.5d in 1955, and 42.5d in 1956 for surplus milk.

In addition to the advance there are deferred or bonus payments at the end of the associations finanical year. Bonus payments arise from a surplus of funds over advance payments caused by (a) under payment of advance, (b) the additional full price payed by the New Zealand Milk Board on the percentages of milk over nominated quota, and (c) any additional bonus declared by companies which purchase the surplus milk. The way the producer associations allot the bonus payment is a further method of

adding incentive for production during certain periods. An example of this incentive bonus occurred in the year 1954 in which an extra 3d per gallon was paid on surplus milk during May, June and July. This type of payment does not occur every year. In 1956, no bonus was paid for the surplus milk produced during this time although there were more funds available. The producer therefore does not enjoy the certainty of such a bonus when planning for high production in the winter period.

The following tabulations show the increasing demand for milk over the four year period 1952 to 1956.

Year	Daily Quota Contract (gal.)	Increase over Prev. Year (gal.)
1952 - 1953	4196	
1953 - 1954 1st 5 months	4397	
Next 7 month period	4562	366
1954 - 1955 1st 10 months	4725	
Next 2 month period	4740	178
1955 - 1956	5657	917

The figures in the tabulation are misleading to the extent that the increase is not entirely due to an increase in demand for milk in the Palmerston North district. Of the increase in 1955/56 year 657 gallons is due to the amalgamation of the Feilding district into the Manawatu association. Part is due to a reserve pool of 150 gallons added by the New Zealand Milk Board to be used to supply other communities outside the Manawatu district which are short of milk in certain periods of the year.

The suppliers in the Manawatu Producer's Association have an advantage in that their association is the sole supply organization for the Palmerston

North Milk District. Any increase in demand is absorbed through this association. The policy of the organization has been to alot the increase in contract quota to the present member; but if the association cannot absorb the increase, then new members are admitted. Those producers in the association which are increasing the productivity of their farms, can do so with the knowledge that they will be able to secure quotas.

CHAPTER III

GENERAL REFERENCE TO METHODS OF RESOURCE USE AND FACTORS INFLUENCING THEIR USE

The local factors of climate, topography and economic conditions which affect the town milk producer have been discussed in the preceding chapter. These factors are common to all farms, but their affects on farm management and the ways in which they are used to combine with available resources of land, labour, capital and management vary with individual farms. The following section discusses in a general way the major resources available, how they vary, and possible explanations behind the reasons for variation in their use.

AVAILABLE RESOURCES

Captial is the main limiting resource in determining the size of a farm. It fixes the boundaries of the farm organization. It determines whether a farmer is a part time occupier, a share milker, a renter, an indebted owner or a debt free owner. Farmers actions depend on the amount of capital behind them. A farmer with a shortage of capital usually invests his income in those things which will give a more speedy return such as stock manure, reseeding, draining etc. The wisdom of making an investment does not depend upon whether it pays, but whether it pays best. Such a farmer also is willing to substitute labour for captial in that the opportunity to work is offered with the cost associated with such capital items as a return. A farmer with unlimited capital, on the other hand, tends to invest in more long range investments, such as permanent buildings, roads, etc., which have little immediate connection with returns. His thoughts are not entirely on whether it will pay at all or give other forms of satisfaction.

Land varies in physical character, in the climate it enjoys, in the amounts of available soil nutrients, in supply and location. For these reasons, land varies in its capacity*, in that some can use more fertiliser and other inputs to better advantage than other areas of land that might have a relative high capacity for using fertiliser but yet be poor at utilizing irrigation water. It is these varying capacities, which cause varying productivity to a unit of land.

Labour available varies on individual farms, one operator may have a large family labour group, which furnishes inexpensive labour, while another might have no family help. Capital and labour are in general interchangeable. If a shortage of labour occurs and there is ample capital, it can substitute for labour by purchasing labour saving machinery or hiring contractors. But if there is a shortage of both labour and capital or if after using capital to the limit; and there is still a shortage of labour, all that can be done is to use the available labour where it will do the most good and some work will not be accomplished.

Some farmers are also better managers of labour than others, this arises through their ability to use labour efficiently, by having the farm well planned, the work load well organized, and by giving certain incentives to the labour force. The factor of age and capacity of the farmer and/or his workers also enter into the farms labour situation.

REASONS BEHIND RESOURCE USE

Though economic principles are of great importance, farms do not always follow them in making decisions. The decisions regarding resource

*Capacity is defined as the ability to combine with other inputs.

use are largely determined by the goals of the farm unit. These goals are not only determined by the farmer; but also by the objectives of the farm family. The objectives of the farm unit are a function of such social and economic variables as age, family composition, education level, stage in the family cycle, and social and economic status. Because of these factors, the goals of the farm unit may vary. With one it is to obtain wealth, another a comfortable living and still another a reputation as a successful farmer. Their aims are not always the same over the years and often change with age, degree of success and other dynamic actions which influence the situation.

In general, however, the farm management has two over all goals: (a) to push profits to a level consistent with the capital resources of the farm operator and (b) to relate choices in the farm business with the needs and wishes of the family. With this latter goal, the needs and wants of the farm family are competing with the farm in the allocation of returns. As for example, a farmer may want to invest in draining one of his paddocks which will increase profits, but his wife wants a new freezer which will add in family satisfaction. These points are all considered when decisions of capital allocation are made.

Other factors involved in decisions regarding resource use are those of human nature, such as preference and prejudice of the farm operator and family, and their concepts and values they hold on what is important. They may be satisfied with the way the farm is being run and do not want to adopt changes in farm practices that would increase the farms income. They may also have personal preference toward certain features of farm operations

such as breed of stock; i.e. they prefer Jersey cows to Fresians, although milk is being sold on a gallonage basis. Although these factors may seem trifle, they do however, influence decisions.

Variations in decisions are also caused by individual farmers having various capacities and efficiencies as farm operators. The wide variation one finds may result from differences in natural ability, from training experience and the actual effort a farmer desires to apply.

Decisions also have their uncertainty aspects caused by lack of knowledge. In particular this is caused by imperfect knowledge of the future. Farmers respond differently to uncertainty in their decision making. Two categories representing extremes can be quoted to illustrate this point. Firstly, there are those who are conservative and require almost complete knowledge of a situation before making a decision. Secondly, there are willing risk takers who are prepared to make decisions with incomplete knowledge of the situation. The amount of risk a manager is willing to take depends upon such factors as the amount of assets he has to lose, the status of his family; his age; society in which he lives; the affect of possible gains or losses upon his social position; and his love of adventure.

As has been shown, each farm is a complex organization with definite individuality. It is a unique and individual unit because available resources vary in quality and quantity and in the way they are combined. The way in which resources are used and combined by the individual farmer varies with the goals of the farm family as a unit, the socialogical factors and their likes and dislikes. Furthermore the situation is dynamic with many uncertain

elements. Since each farm is unique, a programme that is best for one is seldom best for another. In studying the methods and plans adopted by town milk farms in the Palmerston North milk shed, it was decided to study in detail the reasons underlying their adoption on a limited number of case farms.

CHAPTER IV

TYPES OF PRODUCTION PLANS USED IN TOWN MILK PRODUCTION IN THE PALMERSTON NORTH MILK DISTRICT

The production plan can be defined as the way a farmer allocates his resources of land, labour, capital and management to obtain a certain output to meet an expressed desire. Some farm economists state that the manager must use the plan which achieves the highest profit combination, but as discussed previously, socialogical and physiological factors enter into his decisions.

There are several plans of production a town milk producer may follow. His choice of plan usually depends on the resources he has available and the objectives of himself and his family. In particular, decisions regarding resource use are greatly affected by the proportions of the supply produced during the different seasons of the year. In the Manawatu milk shed there appears to be three major categories.

1. Farms with a high winter and spring production of milk, but with low late summer and autumn levels.

2. Farms which are considered as "seasonal town milk production farm", because their production pattern closely resembles the seasonal pasture growth curve, with high spring production, low winter production, and generally a rise in autumn production. These farms are further classified as, (a) those which sell the entire milk supply to a producers association (b) those which sell only enough milk to fill their quota to the producers association, and dispose of milk produced above quota by other means.

3. Farms which tend to have a fairly constant daily level of milk production through out the year.

Each of these methods will be studied as a system of production using an individual case farm.

The production method of any one farm will be examined by comparing the proportion of yearly supply and of monetary return falling into the three price payment periods of the New Zealand Milk Board. These proportions of supply and return will be contrasted with the theoretical percentages to serve as a basis for comparison. The theoretical has been considered as the percentage of supply and income for the three price payment periods of a farm producing at a constant level through out the year, with all the milk sold at the National Milk Price. Theoretical production and return are as follows:

Payment Periods	Percentage of Yearly Production	Percentage of Yearly Return
May - August	33	40
September - January	42	34
February - April	25	25

Though each case farm will be observed individually, comparisons of production methods between farms will be restricted because: (a) both resources used and the way in which they are used are almost always complex and highly variable, (b) the input and output rates change from year to year and from farm to farm, and (c) objectives of each farmer are diverse.

CONSIDERATION OF A CASE FARM IN CATEGORY I

The farm chosen to represent category I typifies the production method of high winter and spring production and low summer and autumn production. An inspection of the records of the producer association

indicates that farms following this general plan are an important group in the maintenance of the winter milk supply in the Palmerston North Milk District.

Yearly Distribution of Production and Monetary Returns

The production pattern for this farm is given in Table V. The table gives the percentage of the total yearly production falling into each price period and compares these percentages with the theoretical.

TABLE V

ACTUAL PRODUCTION AND RETURN DISTRIBUTION
COMPARED TO THEORETICAL FOR 1953 TO 1956

Period	Year	Actual	Theoretical	Difference	Per-cent Difference From Theoretical
	1953-54	36	33	3	9
May - Aug.	1954-55	37	33	4	12
	1955-56	38	33	5	15
	1953-54	40	42	2	- 5
Sept. - Jan.	1954-55	43	42	1	2
	1955-56	38	42	4	-10
	1953-54	24	25	1	- 4
Feb. - Apr.	1954-55	20	25	5	-20
	1955-56	24	25	1	- 4

It is shown that production is 9 to 15 per-cent above the theoretical figures in the winter months for the three years. In the spring and summer periods the actual production varies from 5 per-cent below to 10 per-cent above the theoretical production. The autumn period is from 4 to 20 per-cent below the theoretical production percentage. By using the price periods to illustrate the production trends, it would appear that the actual production is fairly level, but this is not the case.

The true picture of the summer drop in production is not shown in Table V because the term of low production lies in both the five month and three month payment period, and also the spring peak of production is leveled by the drop in production of the latter two summer months of the same period. When the production for the months of December, January, February and March are compared to the theoretical percentage, a more actual picture of the summer slump is shown.

TABLE VI

PRODUCTION AND RETURN DISTRIBUTION COMPARED TO THEORETICAL FOR THE PERIOD DECEMBER TO MARCH

Period of Dec.-Mar.	Actual % Production	Theoretical % Production	Difference Minus Actual	Theoretical Per-cent Difference From Theoretical
1953-1954	28	33	-5	15
1954-1955	25	33	-8	24
1955-1956	25	33	-8	24

In considering monetary returns, Table VII compares the percentages of production occuring within the price periods with the percentage of monetary returns received.

TABLE VII

PERCENTAGE OF PRODUCTION AND MONETARY RETURN
FOR THE THREE YEARLY PRICE PERIODS

Period		1953 - 1954	1954 - 1955	1955 - 1956
May - Aug.	% Yearly Prod.	36	37	38
	% Yearly Return	41	44	45
	Ratio	1:1.14	1:1.2	1:1.2
Sept. - Jan.	% Yearly Prod.	40	43	38
	% Yearly Return	40	36	31
	Ratio	1:1	1:0.84	1:0.82
Feb. - April	% Yearly Prod.	24	20	24
	% Yearly Return	19	20	24
	Ratio	1:0.8	1:1	1:1

The table illustrates that the high winter production was associated with a high monetary return. The percentage of the yearly return received for the four winter months varies between 41 and 45 per-cent, which is above the theoretical 40 per-cent for this period. The five month period contributed between 31 and 40 per-cent of the yearly return which is comparable with the theoretical figure of 34 per-cent. Return figures for the autumn period vary between 19 and 24 per-cent.

The cause for the difference in monetary returns between the spring and summer period and the winter period lies with higher return per unit of milk as shown by the ratio of production to return in Table VII. The ratio illustrates that for each unit of production in the winter months this farmer obtained between 1.14 to 1.2 units of return. Whereas in the spring and summer period, for each unit of production only 1 to .82 units

Figure 3 CASE FARM CATAGORY I, AVERAGE MONTHLY PER DAY PRODUCTION AND RETURN FOR THE PERIOD MAY 1953 to MAY 1956

of return was received. The decline in the spring and summer monetary return was caused by the 30 per-cent decrease in the price of quota milk, which starts on September first. The increase in the amount of milk supplied above quota for which only butterfat payment rates were received, was also important in the lowering of the production to return ratio.

Figure 3 shows the average per day production and return in graphical form and aids in a clearer realization of the exact production and return pattern of this farm. The figure shows that monetary returns have been approximately parallel with production except in the spring months. It again stresses the point that the highest monetary returns are received in the winter though production is not generally as high as is the case in the spring period.

It is therefore apparent that high monetary returns for the winter milk, has caused this farmer to place emphasis on producing as much milk as possible before the decline of price on September first.

Resources Available and Their Use

This case farm consists of sixty acres, of which fifty are highly fertile silt loam, and ten are of a heavy clay loam soil type. Twenty five acres of the fertile silt loam are very wet through the winter because of a creek overflowing, but have the advantage of not drying out so badly during the summer and autumn dry spells. There are forty acres of improved pastures, sown to red clover, white clover, cocksfoot, perennial ryegrass, timothy and short-rotation ryegrass. Ten per-cent of the farm is seeded annually to chou-moullier for winter crop. Supplementry feed consists of purchased hay and concentrate together with home grown chou-moullier, silage and hay.

A share milker is employed, the returns are divided equally between the share milker and owner. The share milker is the normal labour force, but extra labour for harvesting is obtained and the reseeding and field cultivation is usually done by a contractor.

The stock consists of fifty five head of milking cows, which are Fresian-Jersey cross; ten Fresian heifers, and two Fresian bulls. No specific breeding programme is followed, and most of the replacements are purchased. Table VIII is a record of the yearly herd average for the years 1951 to 1955. The records of the years 1951, 1952 and 1953 were supplied by the local Dairy Herd Improvement Association, and the 1954 and 1955 production records were calculated from the average number of cows in milk for the year and the amount of milk sold to the producer's association.

TABLE VIII

AVERAGE HERD PRODUCTION, 1951 to 1955

Year	Number of Cows	Pounds of Milk	Per-cent Test	Pounds of B.F.	Days in Milk	Total Gallons*
1951	60	6428	4.4	283.0	255	------
1952	53	6153	4.36	268.7	280	------
1953	58	6484	4.25	275.6	279	35,352
1954	53	6665	----	-----	---	35,353
1955	55	5840	----	-----	---	32,234

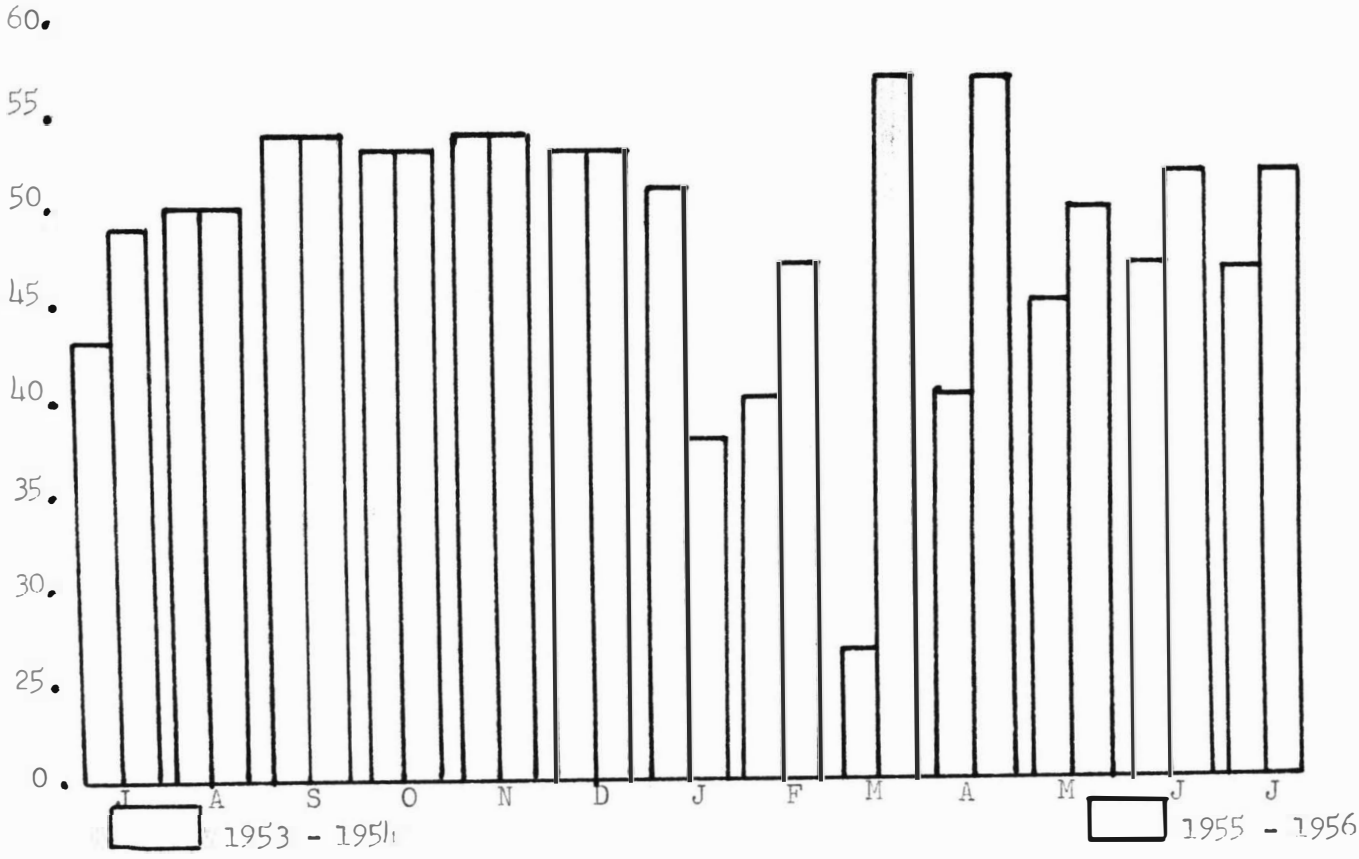
*Total gallons sold to Manawatu Producer's Association.

The operation is geared to achieve high production in winter to take advantage of the high milk price. To achieve this, great emphasis must be placed on a large supply of winter feed. The winter feeding programme is based on saved pasture, hay, chou-moullier and silage. Concentrates are sometimes used in times of severe feed shortage.

The quanity of pasture saved for winter is greatly enhanced by having all the dry animals and replacement stock on a rented runoff during the summer and autumn months. By using the opportunity of renting grass at a reasonable price for animals off the farm, the farm operator saves the grass on his own farm to be used to produce a high value product in the winter period. Silage fed with pasture in the late summer and autumn also allows additional pasture to be saved. These two practices usually enables the farmer to have at least one half of the farm shut by early March. In either April or May, depending on the weather, rationed grazing of the saved pasture is commenced.

The chou-moullier crop which is planted in late November or early December is ready to be fed by the end of May and usually lasts the milking herd till the end of August. Some hay is made, but generally between 20 and 30 tons is purchased. The hay is fed to the dry animals over the winter and to the milking herd if the pasture becomes depleted, and enables overgrazing to be avoided.

Figure 4 Case Farm Category I, Number of Cows in Production



The timing of freshening dates is most important in utilizing this planned feed and obtaining a high level of winter production. Figure 4 giving the number of cows in milk from July 1952 to July 1953 shows two distinct peaks in the number of cows in production. One peak to take advantage of the spring flush of growth and the other to take advantage of the high prices paid for milk in the winter months. The trend was the same for the period July 1955 to July 1956 except that more emphasis was placed

on having more cows in milk during the autumn and winter. The method of freshening being followed enables more pasture to be saved through the late summer and autumn, with an influx of cows coming in milk to be ready for the change of price in May.

Factors Influencing Resource Use

The farm is intensively run with emphasis placed on winter milk production. The farmer feels that this system is the most profitable. The production plan is therefore based on the expectations which allows optimum use of his available resources to achieve their highest profit combination.

The intensity of operation is needed to enable two parties, the share milker and farm owner, to obtain a living from the sixty acres of land. The intensiveness of this farm is demonstrated by the fact that approximately one cow to the acre is carried and that one labour unit manages the herd of between fifty and sixty milking cows.

The share milking contract is on a yearly basis and this makes the farm operator interested solely in the highest return which can be obtained from the farm at the present time and in the immediate future. In this type of management, long range planning and investment of money on permanent farm improvements do not enter in the farm operators capital allocations. He adjust his daily operations on a short time basis to take advantage of the high milk prices and other factors which add to greater net return. An example of this policy is seen when certain features of winter pasture management are considered. It is likely that during late winter and early spring a certain amount of hard grazing will be profitable. The grass before

September the first is worth 30 per-cent more than it is after that date because of the price change. From then on the spring flush should give an abundance of forage even if pastures are grazed close. Certain reccomended methods of pasture management might mean more growth in the months following the September price change, but this farmer is interested in obtaining the production during the high price period.

Some economic factors of high price for both quota and surplus milk during the winter, together with the producer's association policy makes the type of production that is being followed on this farm possible. The producer's association policy has allowed this particular producer to hold his quota, even though his production falls below his assignment for four to five months of the summer period. He does however, pay penality because of his failure to maintain his quota. In the worst month during the three years recorded a penality of £22 was assessed. This money goes into a general fund and is paid back to all producers in the association. Therefore it is difficult to determine the true extent of the penality.

Features of Farm Management

The management respondsibility is much more difficult on this type of farm where the peak of animal requirements are in the winter, compared with seasonal production when animal food requirements approximately correspond to the growth rate of pasture. The high degree of intensity of operation, in which most of the food goes for milk production, has also caused more difficulties in meeting the animals winter feed requirements.

The ability of this farmer in meeting the animals food requirements is greatly affected by weather. The uncertainty of the late summer and

autumn rainfall experienced in the Manawatu is of utmost importance to this farm because of the saving of pasture for winter use. If rainfall is inadequate during the time when pasture growth is to be saved, the entire winter feeding programme is jeopardized. The severity of the winter also plays a major role in the amount of winter feed that will be available. If the autumn were dry or the winter was severe, less pasture would be available and more dependence would be placed on purchased feeds such as hay and concentrates. The margin of profitability then declines and doubt would arise as to thewisdom of this type of production pattern. However, if the growth occurs, the farm operation is set to achieve a plan in which profits are maximized.

Other factors such as the utilization of winter feed, and certain losses which occur through emphasising winter production are also important management features with this type of production pattern.

Proper utilization of winter pasture is an important management function because the pasture is highly valuable. It is a valuable food because it is usually in short supply, it has a high milk production potential, it was conserved by renting pasture for the dry animals during the summer and it is used entirely for the production of milk that is receiving a high price.

The degree of proper utilization of the winter feed on this farm depends upon the weather, on the amount of feed that is available and the labour required in obtaining proper utilization. With the pasture in a water soaked condition during the winter, losses in utilization occurs through pugging and trampling the pastures into the ground. With one labour unit to do the work proper utilization is sometimes sacrificed because of

labour shortage. This frequently happens when adequate feed is available.

With emphasis on winter feed production, certain factors which effect the future yield of herbage become important. The effect of pugging of pasture on future production is not known, but there seems to be a tendency for paddocks to become more open and for yorkshire fog and weeds to become more prevalent. With so much winter grazing on this farm, pugging becomes quite a problem even though the soil is fairly well drained.

There is also the possibility of pasture damage due to competition between and within species in saved pasture. The pasture saved for winter feed is generally shut while red clover is still growing well. This tends to shade and crowd out the grasses, especially short-rotation ryegrass, leaving a paddock depleted of grass for winter growth. This problem becomes quite serious when a farmer is closing one half or more of his farm for saved pasture.

Losses from overgrazing also tend to occur with this type of intensive farming. The operators ability to determine the future forage available is not always accurate, and shortages do occur. These shortages quite often lead to overgrazing, which affects recovery growth. A certain amount of flexability does occur, however, to meet these shortages by having the power to purchase concentrates.

Summary

This farm operator emphisized winter production on the assumption that it maximizes profits. The entire farm operation is built around the expected high price for the entire winter milk supply. He has been taking a large risk in gambling on thecontinued need of the producers association

for all his milk. If by chance a more than adequate supply of winter milk occurs and the high price paid for above quota milk were to cease, the profitableness of this type of production plan would be in question. So far his judgement in taking this risk has been proved right.

The profit lies not altogether with price, but also with organizing an adequate supply of good quality farm feed, primarily in the form of pasture. With the dependence upon pasture for winter feed, weather conditions therefore play a major role in this farms production. Emphisizing winter production als brings forth problems of utilization and herbage losses.

All town milk farms in the Palmerston North district however, are not capable of being successful with this type of production plan. This type of operation has been successfully carried out on this farm only through having a light fertile and well drained soil; being of such a size, layout and state of improvement to enable one good labour unit to meet the major demands for labour.

The intensive operation and the pattern of production being followed on this farm has many risks involved and the degree of success obtained depends largely on the managerial ability of the farm operator. Most town producers find it much easier, and obtain their objectives by following one of the other types of production patterns.

CONSIDERATION OF A CASE FARM IN CATEGORY IIa

The case farm chosen to represent catagory IIa typifies the production method of a so called "Town Milk Seasonal Production Farm", where the production pattern generally follows the seasonal production of a factory supplying farm

with some milk produced over the winter. The majority of the farms producing milk for town supply in the Palmerston North district tend to follow in some degree the production pattern of category II.

Yearly Distribution of Production and Monetary Returns

The production pattern of this farm is shown in Table IX which shows the percentage of milk produced in each price period, and a comparison with the theoretical production percentage. The table shows that during the three years, production was from 10 to 24 per-cent above the theoretical in the spring and summer periods. The production in the winter months was below the theoretical percentage by 24 per-cent, except for one year. The production for the autumn months was 8 and 12 per-cent below the theoretical, except for one year in which it was slightly above.

TABLE IX

ACTUAL PRODUCTION AND RETURN DISTRIBUTION
COMPARED TO THEORETICAL FOR 1953 - 1956

Period	Year	Actual	Theoretical	Difference	Per-cent From Theoretical
May - Aug.	1953-54	25	33	8	-24
	1954-55	32	33	1	- 3
	1955-56	25	33	8	-24
Sept. - Jan.	1953-54	49	42	7	17
	1954-55	46	42	4	10
	1955-56	52	42	10	24
Feb. - Apr.	1953-54	26	25	1	4
	1954-55	22	25	3	-12
	1955-56	23	25	2	- 8

In considering the monetary returns for milk production on this farm, Table X shows quite clearly how the differential scheme has affected this producers returns.

TABLE X

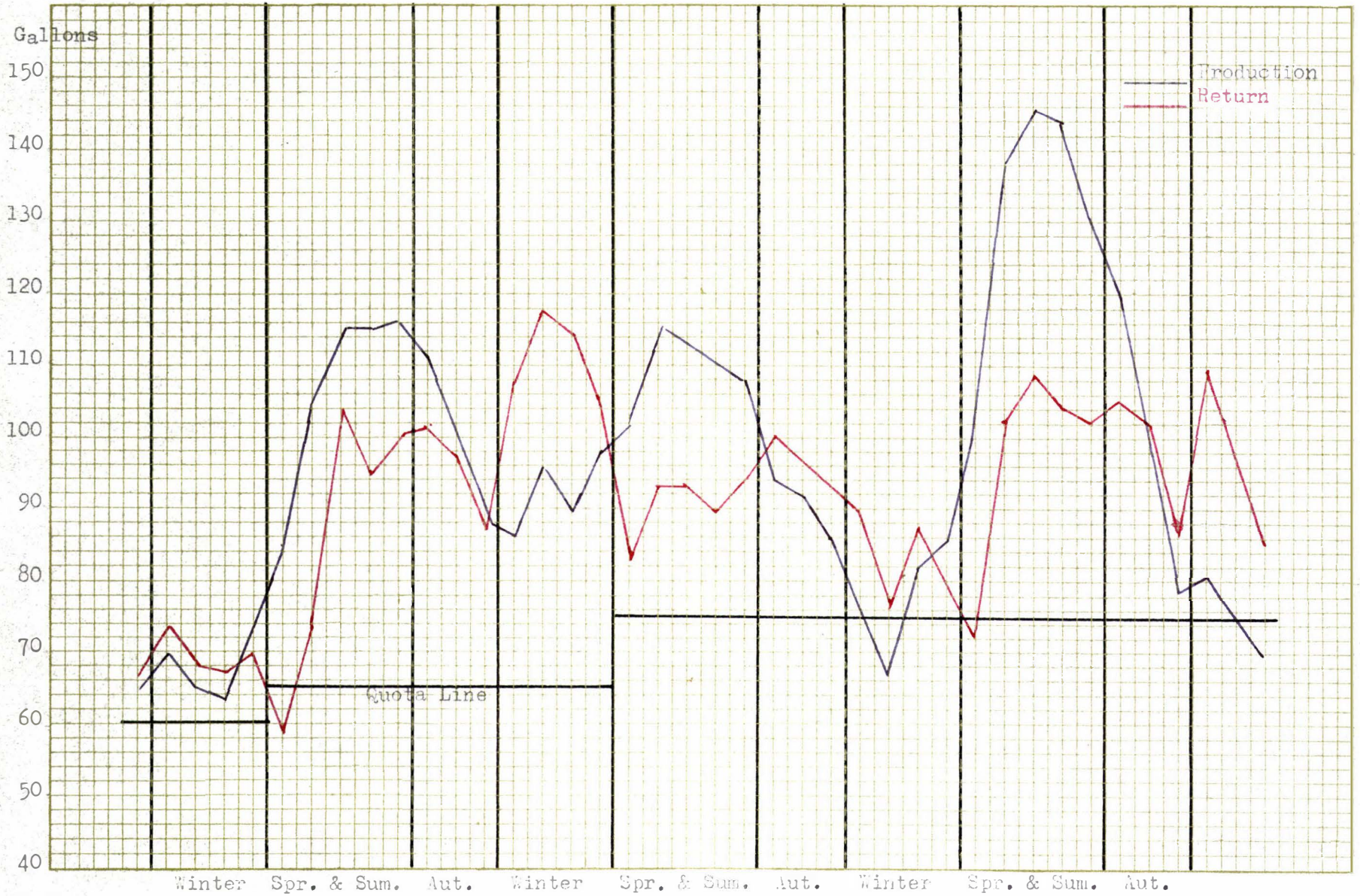
PERCENTAGE OF PRODUCTION AND MONETARY RETURNS
FOR THE THREE YEARLY PRICE PERIODS

		1953 - 1954	1954 - 1955	1955 - 1956
May - Aug.	% Yearly Prod.	25	32	25
	% Yearly Return	32	37	31
	Ratio	1:1.3	1:1.16	1:1.2
Sept. - Jan.	% Yearly Prod.	49	46	52
	% Yearly Return	42	40	44
	Ratio	1:0.86	1:0.87	1:0.85
Feb. - April	% Yearly Prod.	26	22	23
	% Yearly Return	26	23	25
	Ratio	1:1	1:1.05	1:1.1

The table shows that the yearly return received for the four winter months varied between 31 and 37 per-cent, which was below the theoretical return of 40 per-cent for this period. The five months period contributed between 40 and 44 per-cent of the yearly income which was considerably above the theoretical return of 34 per-cent.

In comparing monetary returns with production, the affect of the differential payment again is readily seen. Using the 1955/56 year as an example, 52 per-cent of the total yearly production occured during September and January period, yet only 44 per-cent of the total yearly monetary return was realized. This gives a ratio of one unit of production to only 0.85 units of monetary return. Using the four winter months as a further

Figure 5 CASE FARM CATAGORY IIa, AVERAGE MONTHLY PER DAY PRODUCTION AND RETURN FOR THE PERIOD MAY 1953 to MAY 1956



illustration, 25 per-cent of the total yearly production occured, and 31 per-cent of the yearly return was received. This gave a ratio of one unit of production to 1.24 units of return.

The chief reason for the difference in production to price between the two periods lies in the price differential scheme. Also important is the fact that during the spring and summer months, 8,632 gallons of surplus milk was sold receiving only a manufacturing price, while during the four winter months only 331 gallons of surplus milk was produced which received almost the same price as milk sold under the quota. The surplus milk amounts to 30 per-cent of the total milk supplied by this farmer.

The exact production and return pattern of this farm is shown graphically for the period July 1953 to July 1956, see Figure 5. The graph indicates definite peaks of production namely January 1954; 116 gallons per day,; October, 1954;116 gallons,; November, 1955;145 gallons. The graph also indicates that generally two low production periods occur during the year. One occurs during April, with a rise in production during May and a subsequent fall in July. This has happened in two out of the three years investigated, but during 1954, the production dropped to a low level in July without the autumn rise.

Resources Available and Their Use

This farm consist of 107 acres of fairly heavy silt loam of medium to high fertility. The land becomes very wet during the winter months because of a rising water table, but when drained it is very productive, even during the winter season. Thirty four acres have recently been drained and consist of a highly productive red clover, white clover and short-rotation ryegrass

pastures. The newly regrassed section receives three cwt. of superphosphate per acre which is the only fertiliser applied on the farm. The farm is in a fairly unimproved state. The 34 acres of improved pasture provides the bulk of the feed requirements of the milking herd. The remainder of the pastures are of poor quality giving a high spring flush of production but very little winter growth.

The farm is nearly rectangular in shape with the buildings and milking shed in one corner. The fields are all of 12 to 15 acres in size, and water is piped to two fields only. There is no central race available to serve as access to the fields.

The farm is carrying approximately 80 head of Fresian and Fresian-Jersey cross cattle of which 20 to 25 are replacement stock. The average production of the milking herd is tabulated as follows:

Year	Average Butterfat per cow	Average Pounds of Milk per cow	Average Days in Milk	Average Per-cent Butterfat
1953 - 1954	284	6240	253	4.55
1954 - 1955	291	6548	267	4.4
1955 - 1956	258	5821	265	4.43

The farms labour force consists of the farm owner and his wife, a capable couple in their early 30's and a married man who lives on the farm. The hired man is in his first season. Previously the operator hired part time labor at times of labour shortage.

With the production pattern of this farm resembling the so called seasonal production curve, it becomes apparent that this farmer is depending upon the seasonal pasture growth to supply the main animal feed requirements.

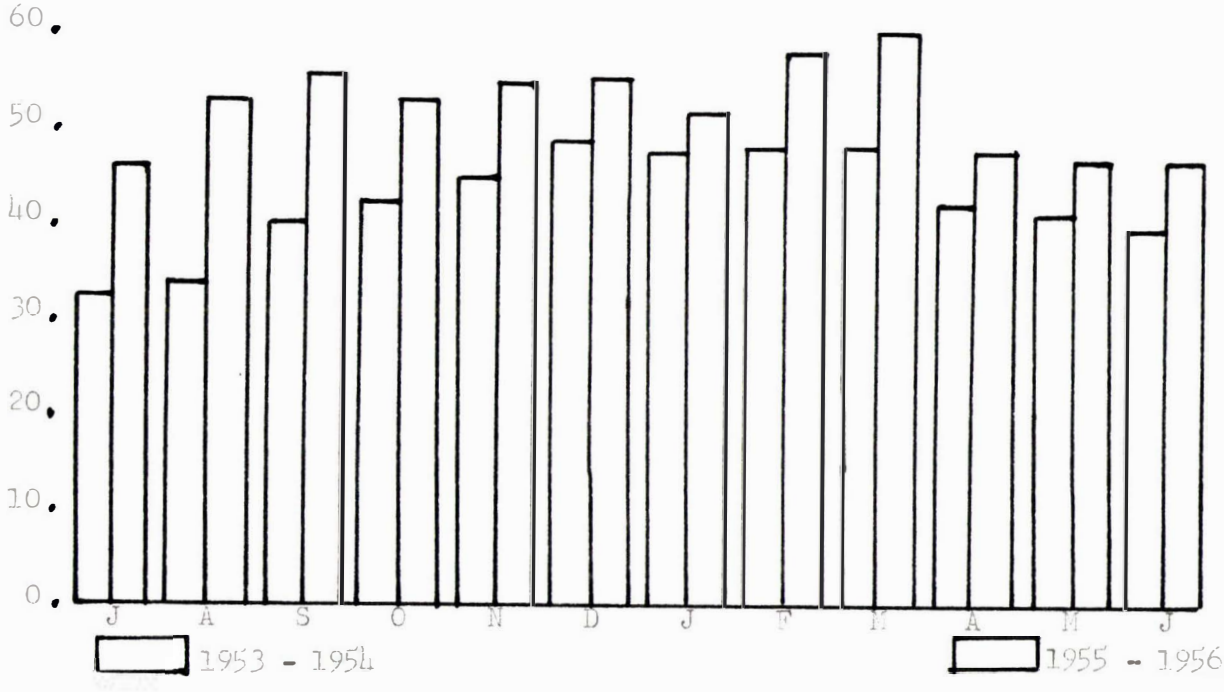
The factor determining carrying capacity is the amount of winter feed available. Because little winter growth is obtained from the unimproved pasture, the winter feed requirements of the milking herd are met by the 34 acres of improved pasture and grass silage. The 34 acres can usually all be saved for winter pasture because the autumn flush of pasture growth generally experienced in the Manawatu, gives enough growth on the unimproved portion to meet the feed requirements of the herd over that period. Good pasture growth during the winter is obtained from the short-rotation ryegrass on the 34 acre section. The available winter pasture is all rationed grazed, and silage is fed once a day. No crop is grown for winter feed nor are any hay and concentrates purchased.

The spring and early summer feeding programme consists entirely of pasture. The unimproved section usually provides most of the pasture needed while the improved section is saved for silage. The summer feeding programme consists of pasture, mainly from the improved section on which red clover is making its growth. Japanese millet is sometimes grown for summer feed, and is break fed to the milking herd. The autumn feed requirements are met by pasture but if the flush is not available, grass silage is used to help meet the animals feed requirements.

In order to obtain good utilization of grass growth this farmer has adjusted his freshening schedule to meet the available feed supply.

Figure 6 illustrates the number of cows in milk for the years 1953/54 and 1955/56.

Figure 6 Case Farm Category IIa, Number of Cows in Production



In 1953/54 the largest proportion of the herd was in milk between November and March to utilize the abundant spring and summer forage, while April to August are the lowest months for the number of cows in production. The 1955/56 year was somewhat irregular through having the highest number of cows in production during February and March. This occured not through the planning of the farmer but through breeding troubles. It is also of interest to note that the increase in carrying capacity in the latter year, brought about by farm improvement.

Factors Influencing Resource Use

The stage of improvement of this farm at the present is an important factor influencing the choice of production plan. Until the farm improvement is such that more winter feed from grass is available to allow a higher carrying capacity and a moreequal distribution of milk production, the seasonal production pattern will be used.

The dependence upon seasonal pasture growth, therefore results in the weather being an important factor influencing the pattern of milk production on this farm. The farm operator decided his carrying capacity and freshening schedule on his estimate of expected pasture growth and feed availability. The uncertainty of forecasting the amount of feed available because of the uncertain weather makes these decisions very difficult. A certain amount of insurance, could be obtained however, to cover mistakes in his predictions by reducing the number of stock carried, but this does not appear to have been done. He seems to be stocked to a level which enables him to take advantage of a good year but suffers loss of production adverse years.

The extent to which variations in seasons cause fluctuations in farm output is difficult to decide, but it is thought to be considerable. For example the winter of 1954 was a very mild one (see Table X) and production

was held at a considerably higher level than was the case in any one of the other three winter periods (see Figure 6 on page 69).

TABLE XI

COMPARISON OF TEMPERATURES FOR PERIOD MAY TO AUGUST 1954
WITH AVERAGE TEMPERATURES FOR THE SAME PERIOD

Months	Minimum Grass Temperatures		Mean Air Temperatures	
	1954	Average	1954	Average
May	37.3	36.9	53.3	51.0
June	35.2	33.5	50.1	47.1
July	34.1	32.3	47.3	46.1
August	34.7	33.5	47.8	47.7

It is very likely that the resulting good pasture growth enabled by a more mild temperature was a factor contributing to the higher output.

The improvement which has taken place since the present owner purchased the farm has been in accordance with the objectives of the farm family and the available capital. The capital the farmer had available initially was exhausted in buying the farm, purchasing stock and equipment. The capital from farm earnings was then divided between family living, farm improvement and the mortage payment. With limited supplies available, the farm managers task was one of using the available capital where it would add the most to returns, and at the same time not compete too severly with the fulfillment of other family satisfactions.

The farm in the first few years, consumed the farm earnings mainly through the provisions of a new cow shed, milking equipment and essential farm machinery. The next project was to obtain living facilities for a permanent hired man. If the farm improvement was to proceed, labour had

to be available to accomplish the task. Previously the capital was not available to build another house, and if a permanent hired man was to be hired hewould have had to be boarded in the farmers home. This was impractical because the house was small and there were several little children. A new hous has just been built permitting a married man to be hired. With the help now available the rate of farm improvement should be increased.

The competition for available capital between better family living conditions on the one hand and farm improvement on the other, have influenced this farm operators decisions. A new home with all modern conveniences is now available. Transport for the family use has been made available through the purchase of a farm truck. The addition of a permanent hired man makes it possible for family vacations or weekend outings. The importance of such socialogical factors weighed heavily in the decisions of this farmer when allocating available capital in the way he did.

Also influencing the production pattern of this farm are factors of the unexpected which affects stock management. During 1956, nine animals on the farm had to be sold because of facial excemia. This factor together with a sterile bull upseting the calving schedule has caused a marked drop in the number of cows in milk during April to July. This in turn caused a drop in production during these months, and the milk supply in July was below the quota. The answer to the problem lay mainly in purchasing replacements, but possibly either through replacements not being available at that time or through shortage of capital this was not done. The possible consequence of this state of affairs, may be a drop in the contractial quota, thereby affecting the income of future years.

Summary

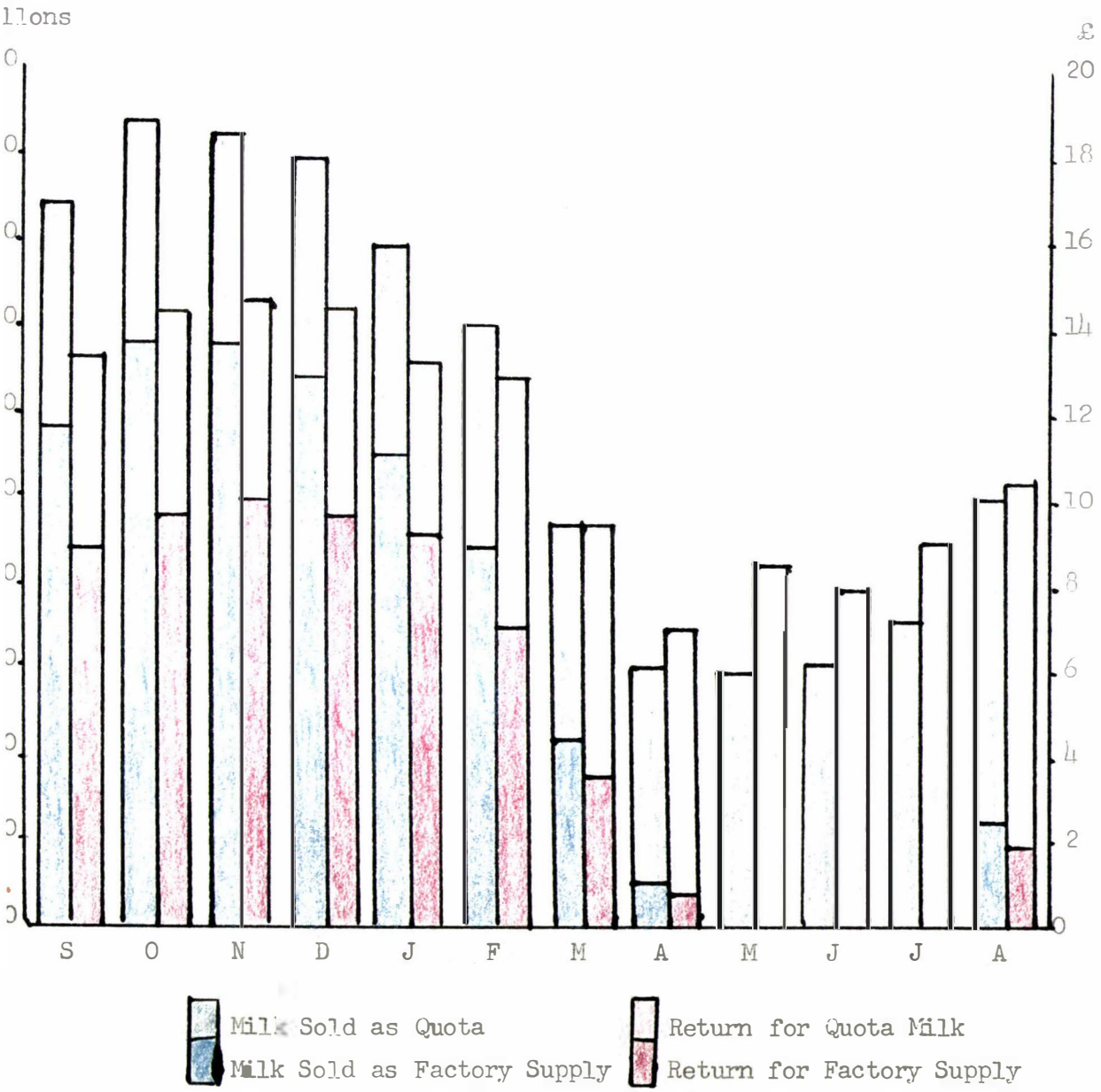
The size of the quota depends largely on the amount of winter milk produced. Seasonal production though resulting in a smaller quota has advantages (a) in facilitating better utilization of pasture through direct grazing, (b) having less labour required and (c) there is less pugging. A more even distribution of milk allows a larger quota and consequently a greater price per gallon of milk produced, but winter feeding difficulties are present.

The seasonal production pattern has been followed on this farm because it has been all the labor force has been able to manage and because of the degree of farm improvement. Now as more labour is available, it is likely that production will be changed to a more even yearly output. The speed with which this change will occur will depend upon the rate at which resources can be made available for farm improvement.

CONSIDERATION OF A CASE FARM IN CATEGORY IIb

The second case farm of this group, follows a similar production pattern as the previously discussed town milk farm, but there is a different method of selling the milk produced. The common method of selling milk by by the town supplier is to let the producer's association handle all the milk produced, but this farmer has preferred to sell his surplus milk to the Glaxo dried milk factory, shipping only the amount of milk needed to fill his alloted quota to the producer's association. However, he sells the entire supply of milk at gallonage rate to the producer's association in the three winter months of May, June and July at the time when town milk is of shortest supply.

Figure 7 Case Farm Category IIb, Average Monthly Per Day Production and Return Received for Milk Sold as Quota and Factory Supply for the Period September 1955 to August 1956



This method of selling milk is now uncommon in the Manawatu Producer's Association but in previous years, was the accepted method for those farmers in the Fielding Milk Producer's Association. This association was amalgamated with the Manawatu Producer's Association in 1955.

Production and Return Distribution

The production and return patternof this farm is shown in Figure 7, which gives the production and the monetary return for each month in the 1955/56 season. The monthly amounts of milk sold to the Glaxo factory and the amount handled by the producer's association are also shown together with the returns from each. Of the total yearly production, 54 per-cent was sold to the Glaxo factory which contributed 44 per-cent of the total income for milk. The other 46 per-cent of the production was sold to the producer's association and was responsible for 56 per-cent of the return.

Table XII compares actual and theoretical production and return.

TABLE XII

ACTUAL PRODUCTION AND RETURN DISTRIBUTION COMPARED TO THEORETICAL FOR SEPTEMBER 1955 to AUGUST 1956

Period		Actual	Theoretical	Per-cent Difference
May - Aug.	% Yearly Prod.	20.1	33	-39.3
	% Yearly Return	26.8	40	-32.5
	Ratio	1:1.3	1:1.3	
Sept. - Jan.	% Yearly Prod.	60.5	42	43
	% Yearly Return	52.1	34	53
	Ratio	1:0.86	1:0.8	
Feb. - April	% Yearly Prod.	19.4	25	-22.4
	% Yearly Return	21.1	25	-16.0
	Ratio	1:1.09	1:1	

There is a definite spring and early summer peak on the farm, as illustrated by the 43 per-cent increase over the theoretical percentage in so far as the production is concerned. The decline in production for the autumn and winter period is shown respectively as 39.3 and 22.4 per-cent below the theoretical production. The monetary return follows a similar trend, when compared with the theoretical. The essential point of interest in the return ratio pattern indicates that for every unit of production in the winter months 1.3 units of return were received, whereas in the spring and summer only 0.86 units were received.

Resources Available and Their Use

This case study farm is located near Fielding by the Oroua River and consists of a 63 acre home place, and 24 acres of runoff located approximately one mile from the home farm. The farm is highly suited for town milk production because of the soil and state of the farm improvements. The soil is of silt loam, highly fertile, well drained, with no excessive pugging; and does not dry out badly over the summer.

The farm is highly improved and requires a minimum of labour for the production obtained. This point is illustrated by the fact that the farm owner and his wife, people in their early 60's are easily and adequately able to handle the work, with some contract labour hired for fencing and haymaking. The fields have water piped to each and are well fenced and bordered by shelter hedges. The milking shed and calf sheds are centrally located with easy access to all paddocks.

The pastures consist mainly of perennial ryegrass, white and red clover. Two to three tons of superphosphate are applied per year only to

those pastures saved for winter feed and to the summer and winter crops. The summer crops consist of three to four acres of soft turnips and two acres of chou-moullier are grown for winter feeding.

The milking herd consists of aproximately fifty cows, and 12 to 13 replacements are raised each year. The animals are Jersey-Fresian and Jersey-Aryshire cross. The herds production is illustrated for the years 1952/53 through 1955/56.

TABLE XIII

AVERAGE HERD PRODUCTION FOR 1952/53 - 1955/56

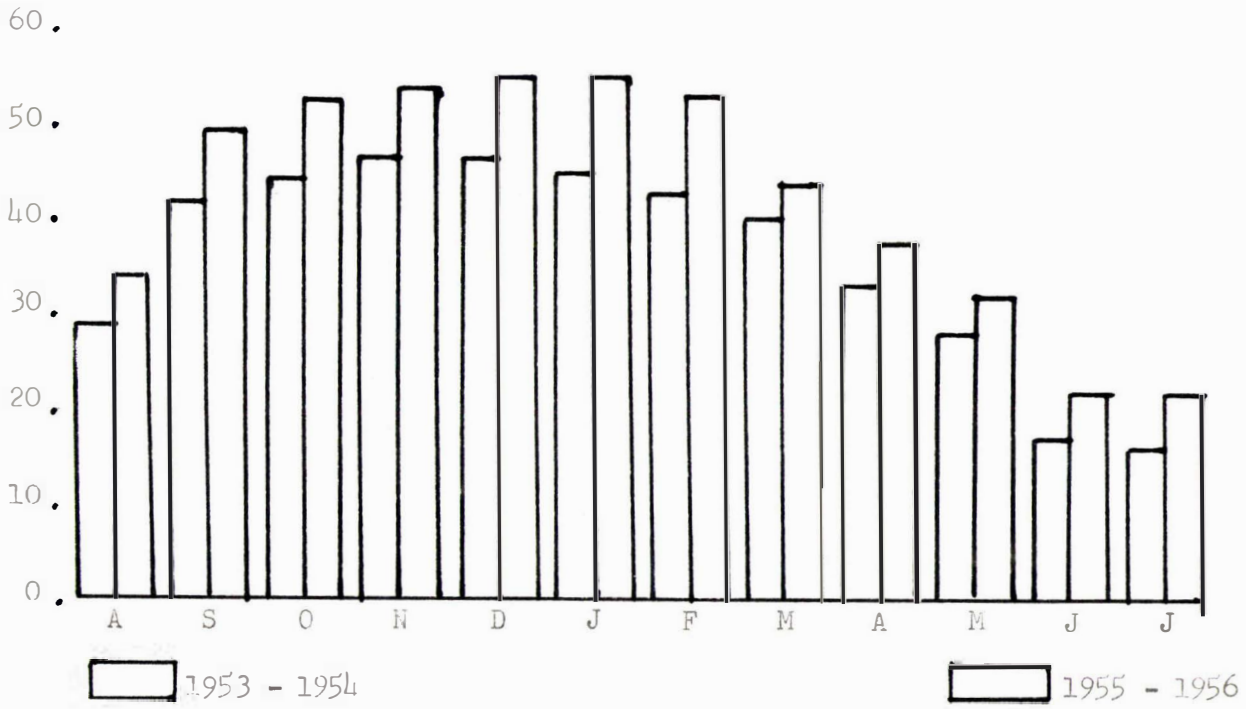
Year	No. of Cows	Pounds of Milk	Pounds of Butterfat	Per-cent Fat	Days in Milk
1952/53	49	8,026	385	4.37	271
1953/54	45	7,809	363	4.52	254
1954/55	52	7,783	352	4.65	267
1955/56	51	8,291	362	4.8	261

The herd has been bred over the years by the farmer and is of outstanding quality. High herd production is not only from having quality animals, but also through excellent stock management.

The winter feeding programme for the milking herd is based primarily on saved grass and the crop of chou-moullier. The chou-moullier which is cut and hauled to the cows, is fed from the first of May till the end of August. The saved pasture is rationed grazed to the herd. Hay and silage are also fed from April till the spring flush of grass and some purchased bran is fed when available feed becomes very low. The summer feeding programme consists of three to four acres of soft turnips, which are fed from January to March, together with pasture. Pasture is the principle feed during spring and autumn, except in dry autumn months when silage is also fed.

The pattern of cows in milk to utilize the available feed is shown in Figure 8 for the years 1953/54 and 1955/56.

Figure 8 Case Farm Category IIb, Number of Cows In Production



The figure indicates that in both years the largest number of cows in milk occurred between September and February. A steady decline then took place till the winter months of June and July were reached. then a distinct rise occurred in August. The figure further indicates that carrying capacity has also been substantially increased over the period.

The increased carrying capacity is due primarily to the influence of the runoff which was recently purchased. The runoff enables the farmer to have both the replacement stock and dry animals off the farm. Silage and

hay are made on the runoff, and fed to the large number of dry animals and replacements during the winter.

Factors Influencing Resource Use

Though the farm is highly suitable for all the year around town milk production, this farmer was not emphasizing winter milk production to any great degree. He did not desire to go into full town milk production for two reasons. Firstly, he felt that carrying capacity would be lowered. The seasonal pattern of milk production corresponds closely to the pasture growth curve, thereby facilitating a greater utilization of herbage by insitu grazing and thereby reducing losses due to conservation. Secondly, the strain of all the year around production, would mean a greater amount of work. As it was the farm couple with contract labour could satisfactorily handle the situation. With full town production, however, another labour unit would be necessary, and they did not feel disposed to take this step.

The farmer therefore maintained only a small town milk quota, largely to utilize the milk from those cows which because of breeding failure or abortions, were milking in the winter period. A small number of cows also calved in the autumn. He was able in this way to take advantage of the town producers need for winter milk, and receive a high price for milk which would otherwise have been sold at butterfat rates. This farmer also used the town milk quota to obtain a larger return for his summer milk. As previously mentioned he retained the right to sell his own surplus milk. This allowed him to send milk of higher test to the Glaxo factory, which buys on butterfat basis, and send the lower testing milk to the producer's association, which buys on a gallonage basis. This manipulation, he feels,

proves highly profitable with this type of herd. The factor of hauling charge also enters into the situation. The surplus milk he sells goes only approximately three miles, whereas if it was being sold to the producer's association there would be a nine mile haul which would add considerably to the total cartage cost.

The main objectives of the farmer and his wife was to obtain wealth and to educate their family. They have been able to fulfill these objectives. However, the farmer is considering putting on a share milker. With this objective, the pattern of production has shifted in the last two years, with more emphasis being placed on winter production, in order to obtain a higher quota. The additional quota will be needed to achieve a higher return in order to maintain two families, the share milker and the owner. In addition, the local milk producer's association has applied pressure to those farmers with small quotas, either to sell more winter milk, or be dropped from town production.

These two factors have caused the additional emphasis to be placed on town milk in the last two years. As a result the quota has been raised from 40 gallons to 56 gallons per day. The additional winter production was not altogether from more cows being in production but was the result of freshening higher producers, so they would milk over the winter period.

Summary

This farmer used several features of management which aided him to obtain the best use of his resources to achieve a high margin of profit. He feels if he was entirely in town milk production his total carrying capacity would be lowered. However, through the use of a small town milk

quota his farms carrying capacity was not lowered at all and he is able to sell the winter milk at a gallonage rate whereas previously it was sold at butterfat rates.

These factors together with the highly productive herd and land, shrewd management and having the farm organized so the work is within the capacity of the labour force made this farm operation successful.

CONSIDERATION OF A CASE FARM IN CATEGORY III

The farm chosen to represent Category III is an example of a farm with a more even distribution of production throughout the year.

Production and Return Distribution

The production pattern is given in Table XIV for the period May 1953 to April 1956.

TABLE XIV

ACTUAL PRODUCTION AND RETURN DISTRIBUTION
COMPARED TO THEORETICAL FOR 1953 to 1956

Period	Year	Actual	Theoretical	Difference	Per-cent From Theoretical
May - Aug.	1953-54	31	33	2	- 6
	1954-55	31	33	2	- 6
	1955-56	29	33	4	-12
Sept. - Jan.	1953-54	46	42	4	9
	1954-55	45	42	3	7
	1955-56	47	42	5	12
Feb. - April	1953-54	23	25	2	- 8
	1954-55	24	25	1	- 4
	1955-56	24	25	1	- 4

The table shows that production varied from 6 to 12 per-cent below the theoretical production in the winter months, 7 and 12 per-cent above the theoretical in the spring and summer period, and 4 to 8 per-cent below in the autumn months.

The monetary return for this farm is shown in Table XV together with ratios of production to monetary return for the three payment periods.

TABLE XV

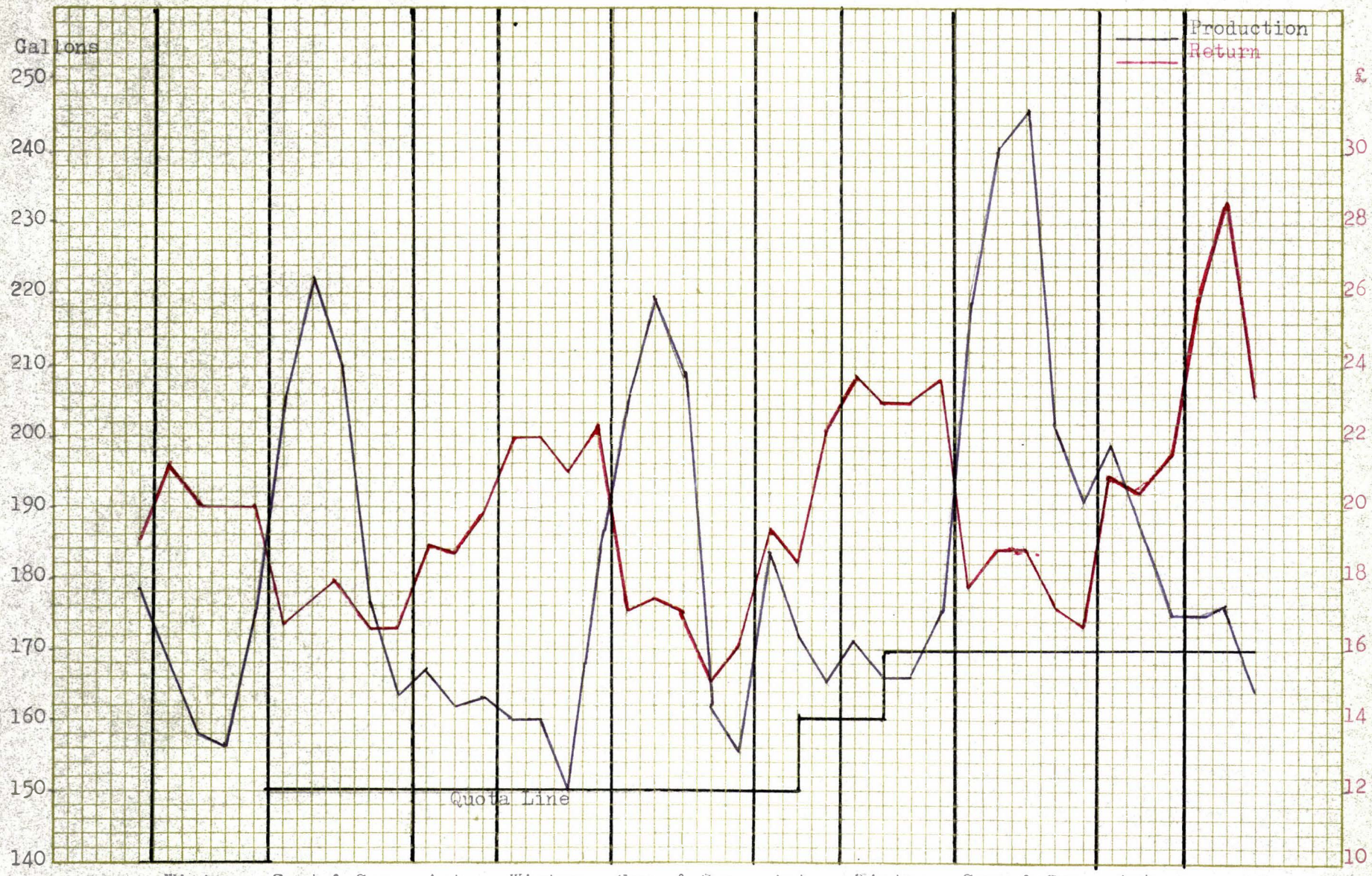
PERCENTAGE OF PRODUCTION AND MONETARY RETURN
FOR THE THREE YEARLY PRICE PERIODS

Period		1953-1954	1954-1955	1955-1956
May - Aug.	% Yearly Prod.	31	31	29
	% Yearly Return	37	38	39
	Ratio	1:1.2	1:1.2	1:1.34
Sept. - Jan.	% Yearly Prod.	46	45	47
	% Yearly Return	38	36	36
	Ratio	1:0.83	1:0.8	1:0.76
Feb. - April	% Yearly Prod.	23	24	24
	% Yearly Return	25	26	25
	Ratio	1:1.1	1:1.1	1:1.04

The percentage of the yearly return received is between 37 and 39 per-cent for the winter months which is slightly below the 40 per-cent theoretical return for this period. The spring and summer period contributed between 36 and 38 per-cent, to yearly returns being above the theoretical 34 percent, and the autumn period was similar to the theoretical return of 25 per-cent.

It can be seen that the spring and summer contributed approximately

Figure 9 CASE FARM CATAGORY III, AVERAGE MONTHLY PER DAY PRODUCTION AND RETURN FOR THE PERIOD APRIL 1953 to JULY 1956



46 per-cent of the production and 37 per-cent of the monetary return. The contribution to the return by the winter months was similar though in those months only about 30 per-cent of the production was handled.

The average daily production and return for each month is shown graphically for the period April 1953 to July 1956 in Figure 9. The monetary return shows a definite peak for the winter months, further emphasizing that although there is a high spring production it does not compensate for the high winter prices.

Very definite spring peaks in production occur in either October or November and minor autumn production peaks in February. The lowest production periods are July and January. Even though there is a definite spring peak, the production between December and August is fairly constant. A further illustration of the even distribution of milk production is shown by there being 86 per-cent of the milk sold as quota supply with only 14 per-cent sold as surplus.

Resources Available and Their Use

The case farm consists of 107 acres of a clay loam soil type of medium fertility, located on flat to undulating country near Bulls. The land becomes very wet through the winter, because of a hardpan 18 inches down causing a rising water table. The entire farm is tile drained, but still becomes very wet through the winter because the soil does not allow the water to penetrate. The land also dries out in the summer. In 1953 irrigation of 30 acres by sprinkler was started and has improved the summer feed situation. The irrigation scheme can apply two inches of water to the 30 acres every ten days.

The farm buildings consist of the milking shed with a refrigerated room for cooling milk, a calf shed, machinery shed, and feeding barn. The feeding barn holds 48 cows and includes overhead hay storage. The buildings are centrally located with concrete walks giving access to each paddock.

The pastures consist mainly of perennial ryegrass, cocksfoot, white and red clover. They are reseeded approximately every eight years working from grass to grass. The fertilising programme consists of sulphate of ammonia applied to the irrigated section during the summer and sometimes in the spring. Four hundred weight of superphosphate per year is also applied to the entire farm.

This farmer is specializing in pedigree Fresian cattle. His herd consists of approximately 120 animals, with 60 to 65 milking cows, the rest being bulls and young stock. The large number of bulls and young stock are kept for selling purposes. The herd average for the years 1953 to 1956 is given on Table XVI.

TABLE XVI

AVERAGE HERD PRODUCTION FOR 1952/53 to 1955/56

Year	No. of Cows	Pounds of Milk	Pounds of Butterfat	Per-cent Fat	Days in Milk
1952/53	53	11,950	452	3.78	289
1953/54	63	11,952	447	3.74	291
1954/55	59	11,369	430	3.78	285
1955/56	68	11,909	448	3.76	288

The herd has been one of the highest producing in the North Island for the past few years. Although the herd is all Fresian, little trouble is encountered with maintaining the solids-not-fat.

A runoff of 46 acres is used for grazing the young stock and dry animals leaving the entire home farm for the milking cows. The runoff, located near Fielding is on free draining river bottom silt loam.

The farm operator started producing town milk in 1941 with an 80 gallon quota. Through the years, with increasing improvement to the farm, and herd improvement, the quota has increased to 170 gallons. The labour force originally consisted of the farm operator and his wife, a very capable woman who has aided considerably in the farm work. Two young people are now hired in addition.

The pattern of production this farmer is following, although still having definite seasonal trends, is approaching an even all the year around production. This farm operator, working toward this goal, has had to adopt practices which would provide a more even distribution of feed over the year, but still obtain good use of his resources to ensure high net returns.

He is faced with the problem of having land not particularly suited to town milk production because of its water logged condition in the winter and its dryness in the summer. The winter condition causes the soil to be very cold, giving very little winter growth and making the pasture difficult to utilize without excessive pugging. There were therefore two definite periods of feed shortage over the year. The summer one has been met by using irrigation together with the applications of nitrogen. The 30 acres of irrigated land supplies enough pasture to meet the requirements of the milking herd through the summer and autumn. Irrigation and fertilisation have allowed more animals to be milked and better quality feed to be available, and have been important factors in increasing the production from 120 gallons

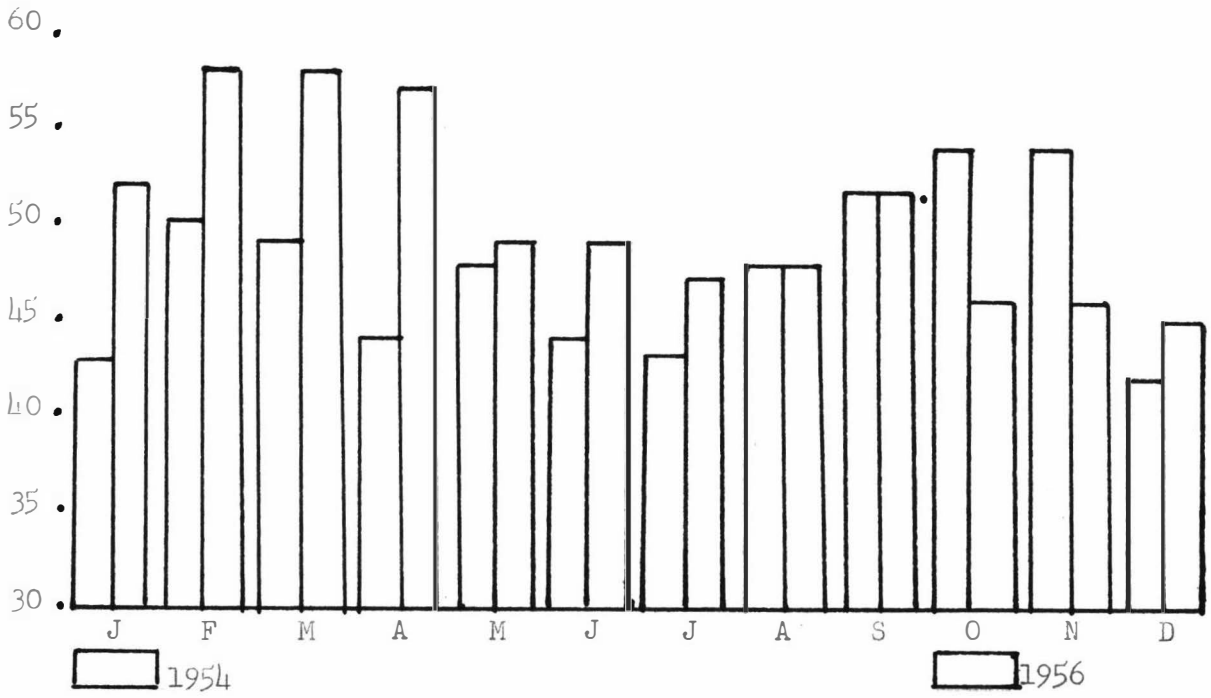
per day to 200 gallons per day. Before irrigation, this feed shortage was met by summer crops of turnips and chou-moullier together with purchased hay and concentrates.

The winter feed requirements are met in two ways, saved pasture and purchased hay and concentrates. The winter pasture is saved by reducing the daily grass allowance to theherd in May and replacing it with hay and some concentrates. The autumn flush of growth from the acreage which is not irrigated, is also used as saved winter pasture. The saved pasture is then rationed to the animals, so as to last through the complete winter period. Concentrates and hay are fed according to the amount of saved grass available, and the production which the farmer wishes to maintain. These supplements are fed in the feeding shed which allows the animals to be kept off the paddocks. A sacrifice paddock is also used to concentrate the pugging.

The build up of winter and summer feed is further aided by placing the dry animals and young stock on the runoff. This allows the enitre feed supply of this farm to be used for the production of milk.

The adjustment of the production pattern to the feed available is carried out through the distribution of freshening dates. Figure 10 shows the number of cows in milk each month for 1954 and 1956 and demonstrates the adjustments that have been followed.

Figure 10 Case Farm Category III, Number of Cows in Production



The figure illustrates that during the 1954 year, the number of cows in milk was highest during the spring period from September to November. A slight increase occured in the autumn. Cows were thus in milk to utilize the spring and autumn flush of growth. During 1956, the highest peak was recorded during the autumn period with only a slight rise in the spring. The shift in the number of cows in milk from a spring peak in 1954 to an autumn peak in 1956 is because the farmer has placed more emphasis on winter

production. The increase in the number of cows in production during the autumn was due primarily to the influx of fresh cows which were to be milked over the winter period.

Factors Influencing Resource Use

It has been previously pointed out that the goals and objectives of the farmer and family determine to a large extent the pattern of farming that is carried out. The goals and objectives of this farmer were largely to gain material wealth. Although emphasis is still being placed on high net returns, their objectives have possibly shifted to pride on their pedigree stock, and a more leisurely life is now also more important.

To achieve highest net returns this farmer has adjusted his operation to take advantage of town milk policies, both national and local. He is striving for a more even distribution of production which will enable him to have a higher quota and allowing a larger percentage of prodution to be sold as quota milk. Although pattern of production might be more costly to maintain, he feels that the additional return from selling a larger percentage as quota milk will more than compensate for the extra cost.

He is also taking full advantage of the pricing scheme, which is on a gallonage basis, by milking Fresian cows. He has further installed a cooling plant for his milk storage, for which he is allowed an extra $\frac{1}{2}$d per gallon. In addition he is virtually assured, because of his cooling plant, that all quota milk sold will be of highest grade.

Although town milk production is the main source of income, the sale of high quality pedigree stock adds considerably to the returns as well as being a source of pride for this couple. Pedigree breeding has entailed

some modification in farming plans from those of a town producer whose sole income is derived from the production of milk. This farmer is interested in per cow production and not just total production from the farm. This is due to the fact that his animals are sold on the basis of production records.

A certain amount of flexability must be allowed so that the full producing potential of each animal is obtained if possible. This flexability is achieved through not having the farm at its full carrying capacity, and this helps compensate for the affects of some of the unexpected and undesireable seasonal influences on feed supply. Flexability is also gained in the feeding of concentrates and hay, which are not limited in supply, but bought and fed as needed. Further flexability is gained through the runoff, enabling stocking rates to be shifted as feed availability changes.

The farm is at the state of improvement where high returns are being achieved. The pressure for high returns is still present, but the work to obtain these returns has eased for the farmer and his wife. They are now using capital to replace labour whereas previously with limited capital, they used labour to replace capital. An example illustrating this point is that where previously the farm operator and his wife would both work long hours to meet the labour requirements, they have now hired two young people that board on the farm to do the majority of the work. This allows the farm couple to have more leisure time and enjoy life more fully.

In giving this account, most attention has been paid to feeding methods and plans, but it would be appropriate to emphasize finally that the outstanding features of the management of this farm are the stock inputs. The stock has been bred over the years by the farmer and is of outstanding

quality. Also the milking, disease treatment and general management of the stock is first class.

Summary

The production method of this farm is one of high cost and high returns. Certain features of the production method, such as irrigation, concentrate feeding, the buying of hay, and the runoff would not be profitable to a large number of town producers. These features, however, are profitable to this producer and are a necessary part of his programme. They are profitable mainly because the cows have the capacity for high production giving a margin of profit for the use of expensive feed; because the farmer through his management ability, has adapted methods to achieve high returns per unit of milk; and because the farm operation is carried on in a highly efficient manner. These factors together with the additional return from the sale of pedigree Fresians, make this farm operation highly successful.

SUMMARY

Three methods of town milk production have been discussed in this chapter. It has been shown that the adoption of a particular production pattern depends upon many factors which very greatly from farm to farm. It is therefore not appropriate to draw comparisons between the farms, but some contrasting points are worth discussing.

Two of the farms supplied large proportions of their production in the winter months. Case farm one achieved this partly through sacrificing milk production in the summer months. On the other hand case farm three

used farm practices of irrigation and purchased feeds to fill gaps of feed shortages. Both farms have achieved a use of resources which they feel will give the greatest returns, but the certainty of obtaining this return each year varies in the two cases. Case farm one is uncertain as to the milk production to be received because of the great dependence on herbage for the feed supply. Such growth is largely determined by the weather and is highly variable within and between years. A risk is also taken in depending upon the producer's association to maintain a high price for all winter milk and also not to reduce the quota because of the drop in production below quota in the summer. How long the producer's association will tolerate this production method is uncertain.

The farm in category three however, follows a method of a more equal distribution of milk production which allows a greater percentage to be sold at quota prices. Irrigation and purchased feed stuffs guarantee feed to be available on this farm to meet the herds requirements. This insurance is costly, but through having cows with the capacity to utilize feed efficiently and the land with the capacity to use irrigation, there is doubtless a good margin of profit in these practices.

Two seasonal producing farms with entirely different circumstances behind their adoption of this pattern were discussed. Both farmers felt however, that by using a seasonal plan they were able to obtain better utilization of forage and use available resources to best advantage, even though a large percentage of the total supply was outside the quota arrangement. One man feels that his available capital is perhaps best spent on drainage and reseeding and improving the general productive capacity of the

rather than on special inputs designed to produce out of season milk. In any case it is doubtful if he should follow the practices adopted in case three because his cows are probably not of good quality and the economy of feeding purchased feed stuffs is therefore more questionable and his land has not the capacity to respond to irrigation.

The other farmer utilises a small town milk quota to obtain a high price for his winter milk from the small number of animals milked through the winter. Although this farm is highly suited for town milk production, the farmer felt the production pattern followed, allowed good returns with less effort than if he was completely in town milk production and this has fit the available labour supply. However, the ultimate aim of the town producer's association is for a more even distribution of milk over the year. As the position of the association with regards to winter milk supplies improves, more pressure will be put on this type of supplier to conform with their requirements. The association will probably tolerate those producers who are making an honest effort to increase their winter milk production, but those who are using a small quota for their own advantages might well be dropped from town supply.

CHAPTER V

COMMENTS ON SOME INTERESTING PRACTICES USED IN TOWN MILK PRODUCTION IN THE MANAWATU AREA

The final chapter is a discussion of a few interesting farm practices observed by this writer, which are being used in the production of town milk in the Manawatu area.

The first section is a discussion of replacement policy of town producers, specifically emphasizing the problem common to all town suppliers, whether he should buy or rear replacements. The second section discusses three feeding practices, concentratre feeding, irrigation, and nitrogen fertilisation. These practices are of interest in that the decision of their use must be considered carefully, because they involve imputs of a costly nature. The final section is a discussion of the role short-rotation ryegrass can play on town milk supply farms, and comments on a few of its associated management practices and problems of utilization.

REPLACEMENT POLICIES OF TOWN PRODUCERS

Replacement stock can either be purchased or reared. The decision is one of importance to the town producer because the cost of obtaining replacements represents a considerable portion of the dairymans total milk cost. The replacement policy varies between districts and within districts of the Dominion. For example, a survey of 166 herds involving 11,201 cows supply the New Zealand Co-op Dairy in the Auckland area was carried out by the Town Producers' Federation and showed that the number of calves raised amounted to 11 per-cent of herd numbers. In the Manawatu Producer's Association a similar survey of 53 herds involving 3,270 cows gave a figure of 20 per-cent . The national figure for the town milk producers was shown to be 16 per-cent.

The replacements needed to maintain the milking herd varies from 20 to 25 per-cent of the herd for town producers. (22) Those producers in the Auckland area supplying the New Zealand Co-op Dairy therefore reared approximately one half of their replacements, whereas in the Manawatu, practically all replacements are reared.

Decisions as to replacement policies are mostly economic and must be made by comparing the cost of each system to the individual farmer. It is generally accepted that one extra cow could be kept in place of rearing one calf to the age of two years. (34) Therefore, considering the income from one cow to be approximately £70* and the average price for purchasing good Fresian and Fresian-Jersey cross replacements in this area to be £30 to £35, there would appear to be quite a margin available as a reward for the extra work and per cow expense involved. A further possible advantage of buying is that a farmer can purchase stock when he wants them but on the other hand, he may have difficulty in obtaining stock of the desired type and quality because of the overall need of replacements by town producers at the same time.

Although high quality cows can be purchased, the productive ability of purchased animals is always uncertain and involves a risk of introducing disease into the herd. Whereas with rearing, the farmers background knowledge of the cows possible production, temperment, longevity and milking characteristics is an advantage to those with good quality cows.

Individual circumstances on farms also enter into replacement policy decisions. Take for example, a farmer with a low producing herd. If he

*The £70 represents the return from a cow whose yearly production of 600 gallons is sold at 28d per gallon.

reared his replacements, it would take a number of years to improve his herd. On the other hand, if he purchased replacements from herds with higher producing cows, more progress might be made.

Size of farm and intensity of management also affect the decisions on replacement policy. On small farms where all the land is suitable for milk production, rearing herd replacements may restrict the number of cows that can be carried and hence limit output. Herd size is often less than the optimum for available labour and other facilities, and where this is so, replacements may be purchased with advantage. Farmers with a lot of land and a shortage of labour would possibly have an advantage in rearing his replacements. This would also hold true for many farms which have land unsuitable for milk production, which might be suitable for rearing replacements. Even in these circumstances, however, the possibility of introducing a more profitable alternative, i.e. sheep, should be considered.

Finally, human inclinations also enter into the decision on replacement policy. Some farmers have a great personal interest in rearing animals. This interest usually stems from pride in having a home bred herd of high quality and the attachment for animals. The interest is not only important in rearing replacements but also in achieving a high level of stock management. Other farmers may possibly not have that interest in stock and do not want to be troubled with the added bother of rearing calves.

Comparison between the two systems of replacement policy on a cost and return basis is therefore very difficult because the assessment of the values placed on the above mentioned factors are troublesome.

It was previously stated that the majority of the producers in the Manawatu reared their own replacements. The impression has been gained that

many make use of runoffs for replacements and this would tend to lower the opportunity cost of raising them. Early weaning on to grass and/or the use of skim milk powder and buttermilk powder in lieu of whole milk also tends to lower rearing cost.

Of the four farmers studied in this report, three reared their replacements. One was a pedigree breeder who reared animals for sale. Another felt he could rear better replacements than he could purchase and that this made rearing profitable. A runoff on which replacement stock were run was an additional factor in making his decisions. The third reared his own replacements to aid in utilizing land that was relatively unsuitable for dairying and he also believed that he could breed better stock than he could buy. The one farmer who purchased his replacements, did so because he considered that an intensity of operation in which all feed was used for milk production paid him best.

It is therefore plain, that the replacement policy to follow depends on the economics, personal judgement and values, herd quality, and size and intensity of operation related to each farm.

THE USE OF CONCENTRATE FEEDING

Concentrate feeding is used primarily in New Zealand by the dairy herds on town supply to fill feed gaps caused vagaries of weather and of mismanagement by the farm operator. It is a comparatively expensive feed and therefore must be used efficiently and at a time when returns would be high if there is to be a margin of profit.

When considering the efficient use of concentrates, we are refering to the amount of milk secured as a result of using them. Professor I.L. Campbell (36) gave the following data illustrating the margin of profit

for two levels of utilization.

A. 100% Nutrients Used For Milk

Concentrate for one gallon of milk 4-6 lbs.
Cost of 4-6 lbs. of concentrate 14 - 16d
Returns from one gallon of milk
Spring and Summer 24d
Autumn 29d
Winter 35½d

B. 50% Nutrients Used For Milk

Concentrate for one gallon of milk 8-12 lbs.
Cost of 8-12 lbs. of concentrate 28 - 32d
Returns from one gallon of milk
Spring and Summer 24d
Autumn 29d
Winter 35½d

It can be seen that with 100 per-cent utilization of meal for milk production a fairly good margin between meal cost and milk returns is received during all three price periods. However with 50 per-cent utilization, only a very small margin exists during the winter period of highest prices.

To obtain a utilization of approximately 100 per-cent, i.e. one in which nearly all the concentrate is used for milk production, certain conditions are necessary. These conditions as stated by Campbell are:

"(a) When the concentrate is fed to cows which are potentially high producers.

(b) When cows are still producing well rather than late in lactation.

(c) When the level of feeding without the concentrate is low rather than already high."

It is inferred from these above statements that in order for meal to be utilized 100 per-cent for milk production, each cow should be fed individually according to their milk production. Cows vary in their response to meal,

therefore, what is economic for one cow might not be so for another. Most town milk suppliers, however do not keep tabs on individual milk weights, and when meal is fed, all cows receive the same amount of meal regardless of the quanity of milk produced.

The return received from meal feeding must not only be considered over the period fed, but there may be a residual effect during the rest of the lactation. In work at Ruakura, Wallace (37) found a definite carry over affect from meal feeding. His experiment was designed on the basis of 13 sets of identical twins on a high plane of nutrition and a similar number on a low plane of nutrition, for approximately 8 weeks before calving. After calving, one twin within each group was fed six pounds of concentrate for eight weeks while the other twin acted as a control, but all twins received the same restricted grass ration. From then on the animals all had ad lib grazing. The results obtained were as follows:

	First 8 Weeks		Total Lactation	
	High Plane	Low Plane	High Plane	Low Plane
Difference between supplemented and unsupplemented (lbs. of milk)	348	450	1157	1868
Pounds of concentrate per extra gallon of milk	9.4	7.1	3	1.8
Cost of additional production (per gallon of milk)	2/4d	9d	1/9d	5½d

Both during the first eight weeks and the remainder of lactation the supplemented animals out produced the unsupplemented. The figures show that the average difference in production induced over the period of concentrate feeding were very much smaller than those due to carry over effect. Also when the carry over effects are included in the returns from meal feeding its use became very economic. It must be remembered however, that pasture

intake was critically curtailed after calving and these results applied under conditions of drastic feed shortages.

It must also be considered that in town milk herds, there are varying stages of lactation and the residual affect would be thought not to be as great as occured in the mentioned experiment. However, there is no data under New Zealand conditions to verify or disprove this statement.

When considering meal feeding there is also certain times in which a better chance for a greater margin above feed cost occurs, not only through having 100 per-cent utilization, but by having larger returns per unit of milk sold,these circumstances are: (38)

(a) In the winter when milk prices are at their highest level.

(b) When the farmer is falling below quota. Returns are then dependent not only on the extra milk produced by feeding meal but there is an extra return above surplus price for the coming year for every gallon of quota milk retained by feeding meal.

(c) When all milk is being sold at quota prices. When producing surplus milk, however, the situation should be studied very carefully.

It is also important for the farmer to understand what should be fed in the way of concentrates. The type of feed needed should be considered. For example, should the feed be of a high protein value or should it be of a high energy value or both. The type of meal to use should be determined by the feeding value of the feed being fed with the meal. Secondly, determination of the cost per unit of food value should also be known. This enables the farmer to select feed on their true value instead of price per ton as usually quoted. Other factors such as palatability and handling quality also enter into the determination of the meal to be used.

Meal is frequently used to fill in for grass when over grazing has occured or when no grass is available. Some town suppliers in this district, however, are on soil which will not give good winter growth, and their need is for continous meal feeding throughout the winter to prolong the availability of saved grass. An example of this point is illustrated by the last years experience on the category III farm. This farm, had a lot of winter saved pasture, but did not receive much winter growth because of wet and cold soil conditions. Nevertheless through the use of concentrate and hay the farmer was able to extend the saved grass over the entire winter and maintained a high production.

Meal feeding can also act as a source of flexability for farmers with intense operations. These farmers are stocked to take advantage of a good growing season. If however, the season is not good, concentrate allows an alternate method of feeding. At this time, there is possibly very little if any margin of profit through meal feeding, but it does give the farmers a way to meet the herds feed requirements.

Farms in category I and IIb used concentrates either to avoid over grazing or for short periods when no grass was available during the winter period.

Summary

The decision as to whether to feed concentrates and if so the degree to feed depends on (a) the inherent productive capacity of the animals, (b) prices to be received, and (c) the feeds available. A careful examination of indivisual circumstances is therefore necessary when making decisions about meal feeding.

THE USE OF IRRIGATION

The Manawatu area is a district in which soil moisture deficiencies often occur in the summers, and one in which the time of autumn rainfall is very variable. (See Chapter II) This problem varies in its severity throughout the district mainly because of differences in soil type and rainfall.

Irrigation can be an essential practice on town milk farms where lack of water is an important limiting factor in farm production, particularly where the land dries out readily and/or being in a definite low summer rainfall area. With other farms, irrigation would rather act as an insurance against bad droughts, and would be necessary only for short periods in some years.

Irrigation is an expensive input requiring relatively large amounts of labour and capital; and therefore, a careful study should be made, not only of the cost involved but also its impact on the whole farm operation, before a decision is made to install a plant. With the first group of farmers, as mentioned above, irrigation offers opportunities of greatly improved returns. The entire farm programme can be expanded. On this type, it is not a question of deciding whether it pays to irrigate if the water is available, but one of whether resources are available to handle irrigation. It will require a new management program involving an increased demand for resources including labour. For example where moisture was the limiting factor, fertility may now limit advancement.

With the second group, the decision should depend upon how much the individuals can afford to pay for an assured summer and autumn feed supply. When a man has limited capital or labour the decision should depend on

whether greater returns can be achieved elsewhere with the limited resource. When capital and labour are adequate, all profitable practices can be adopted and a decision concerning irrigation can be based on whether it is judged to be profitable or not.

However, before any decision on irrigation is made, the farmer must know whether he has an adequate water supply, for the acreage he would like to irrigate.

Irrigation by sprinkler in this district is most suitable because of the supplies of water available, and topography of the farming community. Within this type, there are methods which save labour, but are more costly. If the farmer is short of capital, but has labour to spare, he would likely choose a less expensive low pressure system, even though more labour is required to run it. On the other hand, a farmer who is anxious to substitute capital for labour will possibly use a high pressure system, which requires less work, though it is costly to buy.

How much land to irrigate is a question depending on the amount of water available, and the amount of land needed to meet the summer feed requirements of the herd. A general reccomendation is an irrigated acre for every five or six cows, or alternatively ten to fifteen per-cent of the farm area. (39) However, if water, labour and captial is not limited, a farmer will increase the irrigated acreage up to the point where there is marginal profit.

The disadvantage of irrigation as stated previously is the heavy cost, both initial and yearly; and the heavy load on the labour force. Nevertheless it has many advantages which tend to offset these heavy inputs. Firstly, extra

feed will be available on the farm, that would otherwise not have been there. Various methods are used to handle the extra feed and so the actual affect of irrigation is difficult to evaluate. Some farmers use it to aid in achieving greater production per cow, while others prefer to increase their stock numbers. Secondly, it is an assurance to the farmer that there will be summer and autumn feed of high quality. It can replace the summer supplements of crop, silage, hay or even concentrate. For example, if silage was being fed during the summer, it can now be available for added winter feed. Thirdly, it enables the farmer to be certain as to having autumn saved pasture available for the winter feeding programme and allows him to start saving grass any time after December for the winter reserves. In the Manawatu, with variations in the time of autumn rainfall, this guarantee of feed is quite a relief to the farmer. Finally,it gives a more vigorous growing pasture for winter, and helps to prevent the opening up of pastures and letting weeds get started. There are possibly many other advantages but these are the important factors which the town milk producer should consider.

It must be remembered that this feed supplied by irrigation is expensive, and efficient utilization is therefore important. It is also important that fertility should be maintained to allow the pasture to give optimum response to the environment, and to have species in the pasture which will give the greatest growth response during the irrigated period. The ryegrasses, particularly short-rotation, will not give the summer growth with irrigation that will be obtained from the summer grower such as cocksfoot, and timothy. Sound management of pastures is needed.

An example of irrigation in practice is given by the case farm in category III. This farmer purchased a high pressure irrigation system with an intial cost of £2,150. The yearly operating cost including depreciation and interest is approximately £450 per year. Another labour unit has also been obtained, since irrigation was started to help meet the added labour load brought through expanding the farm operation. Before irrigation however, soil moisture in the summer was an important factor limiting farm output. One summer feeding practice was to grow a supplementary crop of five to six acres of soft turnips. Large quanities of purchased hay and concentrates were also fed. With the irrigation of thirty acres by sprinkler, these practices have been discontinued. In addition the amount of pasture saved for winter feed has been increased. Increase in farm output has taken the form of an improvement in carrying capacity and per cow production. During the months of December through April for the three years prior to commencing irrigation, 19,600 gallons of milk was produced. The three years average since irrigation for the same period was 26,050 gallons, an increased gallonage of 6,450. This increased production, together with the saving in cost of purchased feed has this farmers opinion offset the heavy cost and enabled a greater margin of profit to be obtained.

Summary

The need for irrigation in the Manawatu is variable. With some, moisture deficiency is an important limiting factor, while others need to consider the matter of irrigation very carefully before making a decision.

There are definite advantages of irrigation, extra feed, assurance of summer feed, more vigorous pastures and insured autumn growth. It is up to

the particular farmer to weigh the value of these advantages against the heavy cost of both labour and capital required. However, with the town supplier receiving a high return for milk, irrigation furnishes possibilities in giving a greater net return.

THE USE OF NITROGENOUS FERTILISER

Nitrogen in the form of fertiliser is expensive in New Zealand and therefore its use has to be carefully watched. The New Zealand farmer, dependstherefore on clovers and the return of dung and urine to the pastures by grazing stock for the major supply of soil nitrogen. With many soils poor in phosphate, it is a general practice to feed clovers, phosphate, which is relatively cheap, to produce nitrogen for grasses. However, the nitrogen fixing bacteria in the clover nodules, which are responsible for the fixation of atmospheric nitrogen and conversion to form suitable for use by plants, cannot perform under all conditions, e.g. cold soil temperatures, and excessive wetness, and dryness. Therefore, at certain times nitrogen fertilisers can help a great deal more than at other times if growth has not already stopped.

Nitrogenous fertilisers, are mainly used for the lengthening of growing seasons, by aiding late autumn, early winter and early spring growth. A.W. Hudson, Massey College (40) has reccomended that for late autumn and early winter grass growth, applications of nitrogen should be made between the middle of April to the end of the first week in May, depending on the season. Results from applications of 1½ to 2 cwt. per acre of sulphate of ammonia may extend well into July. For early spring growth, mid-August applications are best, and its affect may extend into October. However, it must be emphasized, that nitrogenous fertilisers can be largely wasted

if applied when grasses are not growing, when soil conditions are too wet or too cold, if other fertilisers are extremely defficient, or if little grass is available in the pasture to respond to the application.

It is difficult to evaluate the financial returns from nitrogenous fertiliser, because of the variety of circumstances surrounding its use and the utilisation of the grass growth promoted by it. However, records of grazing days and estimations of green material weights can often provide a useful guide. Costs are of course easily computed.

There are however, definite times when its use might well pay a town milk supplier. In the winter period the milk produced by additional grass from the use of nitrogen, receives a high price, and several observant farmers maintained that its use was very profitable under these conditions. It may be worth considerably more if it enables producers to have a higher quota, or save a reduction in his present one. Producers of town milk are generally limited in quota by their ability to produce late winter milk and produce it economically. If nitrogen can give an additional supply of milking feed at this time, providing it can be efficiently utilized, the expense will be justified.

An example of nitrogen use was found on the farm of a supplier in the Levin area. This man only uses nitrogen when he feels that supplies of available milking feed are likely to be short. At this time he applies nitrogen in the autumn to those paddocks which he has oversown. He felt that the returns received from nitrogen so used were greater than if the money had been put in concentrates. Nevertheless concentrates have the advantage of being available immediately, whereas with nitrogen the results take

approximately six weeks. The uncertainty of the nitrogen response is also a factor, but can be partially overcome by selection for those applications paddocks where the response would be greatest if growing conditions were to exist. This is a particularly important factor in applications during early spring when the uncertainty of response seems to be considerable.

Nitrogenous fertiliser may also be profitable in some instances when irrigation is being used. An example of this occurs in the case farm studied in category III. The farmer was using irrigated pastures as the sole source of the summer feed, and with the limited irrigated acreage, it was important to obtain maximum yield. Nitrogenous fertiliser was helping him toward this end. It was proving profitable because it combined with irrigation to furnish a quality feed, that was being used efficiently by high quality animals in the production of town milk.

Summary

It seems certain that nitrogen does have a limited place for producing out of season feed on a town supply farm. However, the most economical form of nitrogen is that furnished by clovers, and the management of pastures to maintain a balanced sward, and make efficient use of the animals dung and urine, is highly important. Finally, when money is short nitrogenous fertilisers should only be used if the investment will return a greater margin of profit than if it was used some other way.

THE USE OF SHORT ROTATION RYEGRASS

The town milk producers have a need for a good milk producing feed for winter production. With this thought in mind, short-rotation ryegrass is being extensively used by the town producers to furnish winter pasture.

Short-rotation or H-1 as it is commonly called, has the advantage of a relatively comparative high winter growth as shown by the following table illustrating the yeild of the latest H-1 developed by Grasslands, compared to the yield of perennial ryegrass.

TABLE XVII

SEASONAL PRODUCTION OF RYEGRASS STRAINS (1954-1955)
Grasslands Division, Palmerston North
(pounds of dry matter per acre) (41)

	Perennial	Latest H-1
Winter		
Actual	1345	2253
Relative	100	168
Spring		
Actual	3703	3731
Relative	100	101
Summer		
Actual	1883	1517
Relative	100	81
Autumn		
Actual	1781	1811
Relative	100	102
Total		
Actual	8712	9312
Relative	100	107

The table shows that winter production of H-1 exceeded perennial by 908 pounds of dry matter. If considering 30 pounds of dry matter to be one cow grazing day, then H-1 out yielded perennial by approximately 30 cow grazing days per care during the winter. However, there is a significant decline in growth of H-1 during the summer months.

A further advantage of H-1 is its palatability at all stages of growth and this has made it highly staisfactory for autumn saved and/or winter saved

pasture. Autumn saved pasture is generally referred to as the pasture saved on factory supply farms during the autumn for use in early spring for the period between the time the first of the milking herd freshens and when the flush of growth occurs. On town supply farms however, the autumn growth is for winter feed for the milking herd and therefore a greater percentage of the farm is saved and used at shorter heights. For example, W.S. Long (42) a Levin town supplier, saves approximately one half of his farm for winter feed. He starts building up winter reserves in February and each paddock is grazed off in breaks at least twice between March and August at a height of 6 to 8 inches. However, all town milk farms in the Manawatu do not have the free draining and fertile soil, which Mr. Long has, and can not obtain that amount of winter growth. Such farmers use the same system of saving pasture but it is rationed more closely to allow for utilization over the entire winter, and therefore is fed generally at 12 to 14 inches high. The electric fence is used by both types for rationing the pasture to the animals and to help prevent wastage through dunging and trampling.

The definite disadvantage of short-rotation ryegrass which has caused much dissatisfaction amoung town producers is its lack of persistency. If H-1 is closely grazed during the summer, it has a tendency to die out, especially on light soils during a dry summer. Further, the town producer generally has red clover (cowgrass) in the pasture for summer growth. The common method used to utilize red clover growth is to allow it to become rank and then break graze with the electric fence to help give protection against bloat. This method allows the red clover to crowd out the H-1 through competition for light and space.

The growth form of this grass also allows further losses to occur. It has a more upright growth than perennial ryegrass and does not have its tiller density. As a result, more open pastures occur and there is a greater tendency for pugging damage. Thereis also a tendency for town milk suppliers to overgraze during the winter. Such overgrazing occurs especially in the late winter when feed is becoming short and also during a hard winter when little growth is occurring.

These factors mentioned above account for the lack of persistency of H-1 experienced by some town milk suppliers. However, the latest short-rotation ryegrass developed by Grasslands Division gives greater persistency through having more vigour in the summer period. (41)

In order to obtain the greatest value from the use of H-1, certain practices must be followed to help maintain it in the pasture.

The Practice of Oversowing

Because of its vigorous seedling growth, oversowing H-1 in the autumn is an accepted practice giving a renewal of the grass in time for winter growth. Oversowing is accomplished by three methods; drilling, cultivation and broadcasting, and broadcasting without cultivation. Of these three, Cross (43) has found that drilling of the seed by a furrow opener, attached to the coulter tips of a standard hoe-coulter drill and the use of a disc coulter drill gave the quickest germination and the best balanced sward.

The expense of buying a drill makes it prohibitive to many farmers. However, good results can also be obtained by broadcasting the after surface cultivation with discs or harrows. This method entails more labour and seed, and also the climatic conditions need to be favourable to achieve a satisfactory establishment.

Nevertheless, to be successful with any type of oversowing the correct pasture management needs to be followed. Cross and Glenday (43) have set forth the following reccomended management practices:

1. In clover dominate pastures the proper management consists of hard grazing followed by the introduction of seed and fertiliser. Subseqent grazing management should differ from normal new pasture management until the following spring. Lax grazing will allow the H-1 to become throughly established and well tillered.

2. When clover dominance is great and fertility is adequate, successful results can be obtained by hard grazing immediately before overdrilling, continued until germination. Grazing management favouring grass growth should be followed during the early stages.

Although oversowing is an accepted practice, not many town milk farmers in the Manawatu are taking advantage of its possibilities. An example of the advantages incurred through its use is shown by the experience of a town producer in the Levin area. He was losing the H-1 from his paddocks over the summer period and during the winter it suffered further set backs from what he called "eating it right out". He now drills H-1 into the paddocks both in the autumn and in the spring and has achieved good success in restoring it. He feels that the disc drill has more than payed for itself in the results obtained from oversowing.

Extensive oversowing has also been carried out at the Massey College dairy farm. (44) The benefits derived from one paddock which was oversown are shown in Table XVIII.

TABLE XVIII

COW GRAZING DAYS* PER ACRE DURING THE WINTER AND EARLY SPRING FOR PADDOCK 5

Month	1952 - 1953	1953 - 1954	1954 - 1955	1955 - 1956
June	-	-	7	-
July	-	-	7	80
August	33	-	41	22
September	27	21	38	33
Total	60	21	93	135

*The cow grazing day closely corresponds to 30 pounds of dry matter which is an assumed intake of a 850 pound Jersey in full milk production.

The paddock was grazed to the end of May during the 1952/53 and 1953/54 years. In 1954/55 and 1955/56 it was spelled during late summer early autumn and oversown. The oversowing was done in 1955 by a disc drill at half the seeding rate, used in the broadcast oversowing of the previous year. Though all the increase was perhaps not due to oversowing, the figures illustrate a trend toward greater winter production.

As shown, oversowing is important in obtaining winter pasture growth, difficulties arise in organizing the feeding of the herd when such paddocks are being oversown. Various methods have been employed to meet this problem. For example a farmer with irrigation is able to maintain the herd on irrigated pasture with possibly some silage and hay. This allows the farmer to oversow

and spell the remainder of his farm early in the autumn, and then oversow if necessary the irrigated portion when the other oversown paddocks are ready to feed. Another farmer might be depending on a summer crop, together with paddocks of red clover. With this system he would possibly need two distinct periods of oversowing. Part of the farm would be oversown in February or March, when the summer crop is being fed together with breaks of red clover pasture. The other oversowing would occur during the latter part of April or early May when dependence for feed can be placed on the first grass paddocks oversown and supplements such as a late summer crop or silage and hay. These are just tentative suggestions and decisions would be greatly affected by the weather.

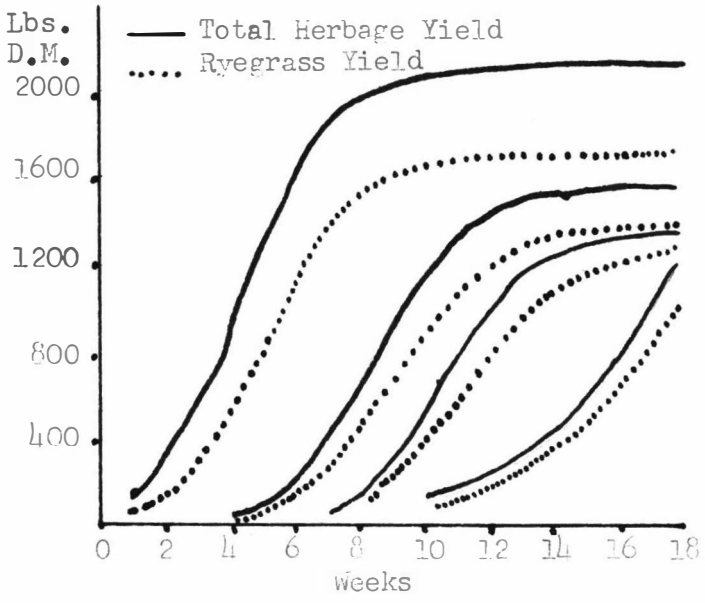
A further method to allow oversowing was observed on the case farm in category I. Although, not using oversowing to the fullest advantage, this farmer is able to oversow and spell a considerable portion of his farm because a large percentage of the herd is dry and on a runoff during the late summer and autumn.

Grazing Management of Short-rotation Ryegrass Pastures

Proper grazing management is important in maintaining H-1 and in obtaining optimum pasture growth. This short discussion of grazing management, will be limited to a few factors of specific importance to town suppliers.

R.W. Brougham (32) has demonstrated that a short-rotation ryegrass and white clover paddock has a growth curve which is sigmoid in nature. See Figure 11 on the following page.

Figure 11 - Fitted logistic curves for total herbage and ryegrass yields (lb. D.M./ac.) for the four dates of spelling. (32)



he has illustrated that there exists three phases of growth. The first phase in which the daily increment in dry matter increases. The second growth phase, when the daily increment in dry matter is approximately constant, and the third phase when the rate of increase of total herbage starts to decline. An important reason for the differences between the first and second phase is assumed to be the absorption of the incident light energy. During the first phase the foilage cover was not dense enough to absorb maximum incident light energy, and the second phase started when enough leaf area growth was present to make absorption at a maximum. The third phase is believed to be largely caused by the transition from vegetative to reproductive growth.

These results therefore suggest that to obtain maximum production of herbage, the pasture should be grazed from the begining of the third phase back to the begining of the first phase. As the seasons change and the light available and temperature varies, so do the length of duration of the various phases also change. (Refer to Figure 11) For example, to obtain maximum growth during the spring period the pasture would presumably be grazed from 12 or 15 inches down to about 5 inches. Maximum growth during winter would be obtained by grazing from a level of 6 to 9 inches down to one or two inches.

In other words a smaller leaf area is needed for maximum light interception in the winter than is needed for the remainder of the year, and therefore the pasture can be grazed at a shorter level in the winter and still absorb maximum light energy. Brougham maintains that it is probable that, as the light intensity diminishes with the approach of mid winter, maximum photosynthetic activity will be achieved with a progressively smaller amount of foilage. These factors are borne out by Table XIX which gives the

total dry matter yield for a complete year for four grazing treatments carried out with sheep at Grasslands Division, Palmerston North. (45)

TABLE XIX

Total Dry Matter Yields (lb/acre) for the four grazing treatments with the number of grazings shown in paranthesis.

Season \ Treatment	4"-1"	7"-3"	9"-1"	12"-3"
Summer 1955/56 (2.12.55-28.2.56)	4700(5)	6850(5)	5700(3)	6150(4)
Autumn 1956 (1.3.56-1.6.56)	2230(3)	2770(3)	2920(2)	2400(2)
Winter 1956 (1.6.56-31.8.56)	2410(3)	1530(3)	2490(2)	1930(2)
Spring 1956 (31.8.56-27.11.56)	5060(6)	6120(7)	6380(4)	6920(5)
Total (2.12.55-27.11.56)	14400(17)	17300(18)	17500(11)	17400(13)

The table shows that during the summer period the 7"-3" and 12"-3" were the best producers. In addition to permitting improved light interception the 3" cover helped the conservative moisture, and kept the soil cooler. The reduced yields accompanying the 1 inch cuts could be due either to the affects of greater heat on the grass or to the lesser light interception. During the autumn period the 9"-1" and 7"-3" received the highest yields. The poor results of the 4"-1" stage were possibly due to the still damaging influence of heat. The similarly poor results of the 12"-3" were possibly caused by the fact that this grazing level did not correspond as closely to the second growth phase as the other two grazing levels.

In the winter period the 9"-1" and 4"-1" grazing heights gave the greatest yield. These heights evidently correspond more closely in the winter to the second growth phase for this particular pasture.

In the spring the table indicates that the 12"-3" and 9"-1" gave the best yields. Actually, in theory it would be thought that the 7"-3" would replace the 9"-1" in order of yield. Brougham feels that possibly the 7"-3" suffered from lack of fertility at this time because the grazings were of short duration and the sheep did not return the full compensation of dung and urine to the paddock, consequently taking the fertility away.

Two further points should be mentioned concerning height of defoliation. Firstly, the grazing at the 7"-3" levels in summer and autumn protects short-rotation from the smothering affects of red clover which occurs at more rank growth. Secondly, by utilizing at lower height levels in the winter greater production is obtained, than would be the case generally when the autumn saved pastures are spelled for a considerable time. As is shown in Figure 11, very little increase in growth in total yield was obtained from the 9th to 18th week from pasture closed on the first of April. While for the same period, pasture closed on the 9th week, yielded approximately 1200 lbs. of dry matter per acre. Apparently the saving of autumn saved pasture for long periods may result in loss of potential yield. Also with the longer spelled pasture greater losses result from inter and intra-species competition.

To achieve these heights of defoliation, stock control must be maintained, through some form of subdivision. Without adequate subdivision, it is impossible to adopt any system of alternate grazing and spelling of pasture.

On a farm, it is often difficult to arrange the grazing management so that pasture yields are maximised. Other factors affecting farm returns frequently conflict with pasture management ideals. We have already seen that a price change in produce at a given date as occurs on town milk supply farms is a case in point. Another problem is the grazing of paddocks when they are wet.

Pugging is a very big worry to the town supplier who is using winter pasture growth as a large percentage of the herds diet. The amount of pugging depends on the following factors which are related.

(a) Soil type - As the soil type becomes heavier the tendency for it to hold water increases, thereby making the soil more subject to pugging.

(b) Amount and size of animals treading on the pasture.

(c) Soil moisture - Greater is the extent of the animals pugging as soil moisture increases.

The exact damage pugging has on the pasture is not altogether clear. Myers (46) has postulated that pugging acts in the following ways:

"(a) Short term wastage loss of pasture herbage already produced.

(b) Long term affects on growth due to:
1. Crushing of foilage causing defoiliation of tillers and leaves.
2. Hoof penetration of the soil causing root disturbance.
3. Soil physical changes."

By soil physical changes he meant that trampling could produce a sealing of the soil surface through puddling and/or compaction. This could adversely affect plant growth through mechanical impedance of roots, decreased soil aeration and adverse soil moisture relationships.

Edmonds (47) working at Grasslands, has found definite decreases in pasture yield as a result of pugging. His work, to be published in the near future, shows that puddling brought about by trampling decreased yield. The puddling was apparent especially during times when moisture was above field capacity and water stood on the surface. With treading at this time, puddling was generally increased. After puddling of a field occurred, the water is not able to penetrate through the surface and this leads to more extensive puddling and damage.

Certain practices help prevent pugging and aid in utilization of winter

pasture growth. Firstly, if through drainage, excessive moisture is able to be drained away, the pugging losses will be reduced. Secondly, the sacrificing of one paddock is frequently seen, preferably the one to be used next for a crop, is used as a concentration paddock during a period when pugging is likely to occur. Supplementary feed such as hay and silage are fed out in this field. The animals are placed on a neighboring paddock just long enough to eat the ration of grass and then return to the sacrifice paddock. Thirdly, a feeding barn is used by some producers, especially those on very wet and puggy soil. It acts more or less the same way as the sacrifice paddock. It is expensive and is perhaps only justified in use in special cases.

Summary

Short-rotation ryegrass can greatly improve the town milk producers winter feed supply, but its usefulness depends on the amount of pasture that can be saved and the growth which occurs during the winter. Oversowing is important in maintaining a stand of H-1 capable of giving growth for autumn saved and winter grown feed. However, to achieve maximum use of short-rotation a plan of alternate spelling and grazing at appropriate heights must be followed. Further to achieve utilization of this winter growth with out damage to the sward, definite practices must be followed to aid in the prevention of pugging.

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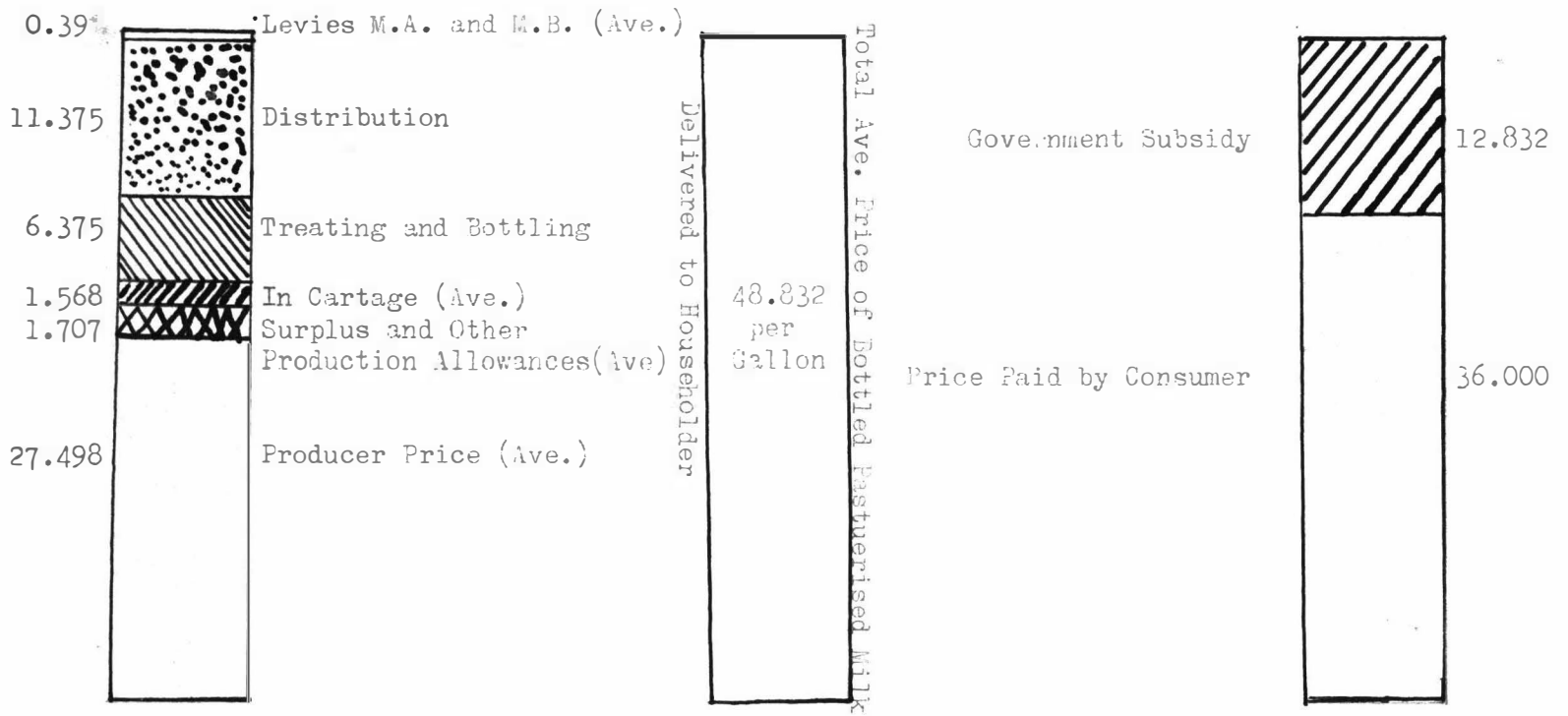
APPENDICES

Appendix 1A

COST AND MARGIN STRUCTURE OF HOME (1)
DELIVERED BOTTLED PASTEURISED MILK
(pence per gallon)



Appendix 1B

ADJUSTED TOWN MILK PRICE
1955/56 MILK YEAR

Basic payment for butter fat for cheese manufacture 1955/56		38.459d
Loss on Whey		.750d
		39.209d
Plus increase notified by N.Z. Dairy Products Marketing Commission by Circular 177 of 4.11.55		.500d
		39.709d
Add estimated net surplus on cheese manufacture in 5 cheese districts 1954/55	40.100d	
Estimated Basic Payout	40.051d	.049d
		39.758d

12,000 lbs. butterfat @ 39.758d	£1,987.18. 0d
Labour award	£ 200. 1. 5d
Interest on Capital @ 4½% (£4,400 - £3,600) (£800)	£ 36. 0. 0d
Extra working and maintenance cost (.625d on 20,000 gals.)	£ 52. 1. 8d
	£2,276. 1. 1d

Average price $\frac{£2,276.\ 1.\ 1d}{20,000}$ 27.3127d per gallon

The above data was obtained from the New Zealand Milk Board, Palmerston North, New Zealand.

Appendix 1C (13)

SEASONAL DIFFERENTIALS

Summer	22.50d	x	585	13,162.50
Autumn	28.00d	x	330	9,240.00
Winter	33.7842	x	400	13,513.7005
	27.3127		1,315	35,916.2005

Appendix 1D (19)

TOWN MILK PRODUCER PRICE 1956/57 QUALITY PAYMENT

The following prices have been fixed by the Minister of Agriculture:

	National Town Milk Price	Seasonal Prices		
		Spring & Summer (Sept. to Jan. inc.)	Autumn (Feb. to Apr. inc.)	Winter (May to Aug. inc.)
	d. per gal.	d. per gal.	d. per gal.	d. per gal.
(a) First Grade:				
For milk which passes a 6-hour reductase test and which while generally complying with the accepted national standard of 4.3% butterfat for town milk, does not fall below 3.5% butterfat	29.2661	24.5	29.5	36.0435
(b) Standard Grade:				
For milk which passes a 4-hour reductase test but fails to pass the 6-hour test and/or which contains 3.25% butterfat but not 3.5%	28.7661	24.0	29.0	35.5435
(c) Second Grade:				
For milk which fails to pass a 4-hour reductase test and/or contains less than 3.25% butterfat	24.7661	20.0	25.0	31.5435

NOTE RE (b): The Seasonal prices for Standard Grade Milk for summer, autumn and winter are those fixed on behalf of the Minister of Agriculture for purposes of the Milk Marketing Order, 1955.

Appendix 1D (continued)

The main text of the Government decision on the Town Milk Producer Price is as follows:

"(a) The present town milk formula to lapse and a starting point for the fixation of the price to be the town milk price for the 1955/56 Milk Year.

(b) This price to be increased by .5d per gallon to settle the finest cheese claim of the Federation.

(c) A further .5d per gallon to be allowed on milk testing 6 hours or over reductase and 3.5% or over butterfat, and on milk which on test does not reach these standards lower prices to be credited to producer associations by the New Zealand Milk Board (these prices are set out above).

(d) The limited amount of milk which for some reason cannot be tested is to be assumed to meet the quality standards of 3.5% butterfat and 6 hours reductase test unless an adverse report is made by the Dairy Division on the producers standard of hygiene.

(e) The different prices in respect of milk tested to be credited to producer associations by the Board in subsidy reconciliations. For this purpose the present second-grading scheme to be amended to the extent necessary.

(f) Rises and falls in the guaranteed price equivalent of finest cheese subsequent to the 1955/56 Milk Year to be translated into the Town Milk Price according to the existing ratio of 1d per lb. of butterfat and .6d per gallon of milk.

(g) A special inducement allowance equivalent to .2d per gallon all the year around will be paid to the whole of the South Island for the duration of this price fixation basis, with the provision that where advisable the disembursement of this allowance be lined with existing quality standards.

(h) Any special production allowance being paid on the South Island to be absorbed to the extent of the .2d per gallon purposed as a special inducement allowance for the whole of the South Island.

(i) A further .125d per gallon on all milk to be approved to meet any special production allowances apart from the main South Island .2d per gallon. The money to be disbursed by the Board after consultation with the Federation, and any balance of funds to be disbursed to all producer associations at the end of the year.

Appendix 1D (continued)

(j) The existing farm chilling margin to be allowed towards the cost of farm chilling wherever suitable plants are installed.

(k) Chilling plants to be installed to the approval of the Dairy Division and the conditions of payment to be decided at a later date (i.e. on what gallonage the payment is to be made, plant capacity,etc.).

(l) Seasonal prices to be fixed on the ratio of approximately 160 : 100 between the winter and summer prices in problem areas."

Appendix 1E

MAIN PROVISIONS OF STOCK AMENDMENT ACT 1956, TB IN CATTLE

1. All cattle which are being pastured or kept on any premises which are used for the purposes of producing milk or cream for sale for human consumption (being premises which are used as a dairy that is registered, whether conditionally or unconditionally, as a dairy under the Dairy (Milk-Supply) Regulations 1939, or which are used for depasturing cattle kept in connection with any such dairy) shall from time to time, as the Chief Inspector of Stock shall determine, be tested with the tuberculin test for the purpose of ascertaining whether any such cattle shows a positive reaction to the test.

2. Replacements: The owner of cattle who brings or permits to be brought on his premises any cattle which have not within the preceding three months been tested for T.B. must notify an Inspector within seven days of the presence of such animals on his property.

3. Compensation: For the purposes of the Act the fair market value shall not exceed a maximum of £28 per animal. The compensation rates payable in respect of cattle destroyed of anyone owner

Appendix 1E (continued)

on any one premises are:-

Percentage of Cattle Showing a Positive Reaction to Test to Total Number Tested	Proportion of Fair Market Value Payable as Compensation in respect of all Cattle showing a Positive Reaction to Test
Not exceeding 10%	6/10ths of fair market value
Exceeding 10% but not exceeding 20%	7/10ths of fair market value
Exceeding 20% but not exceeding 30%	3/4ths of fair market value
Exceeding 30%	8/10ths of fair market value

4. Aggregation: The provision in the Act reads as follows:

> Provided also that the said proportion in respect of the first test made after the commencement of this section of the cattle of any one owner on any such one of such premises and in respect of all tests of cattle of that owner on those premises during the immediately succeeding fifteen months may, at the end of that pe iod if the owner so desires, be determined by reference to the percentage which the total number of animals showing a positive reaction to any of the tests bears to the total number of animals tested (irrespective of the number of tests in respect of each individual animal).

5. The loss of production bonus is paid at the rate of £12 per cow or heifer. This payment is not authorised by stature but by Cabinet decisions.

6. In order to obtain the maximum benefit from tuberculin testing of town supply herds, it is necessary to operate the scheme so that tuberculosis is controlled and eradicated in the individual herds in as short a time as possible. This means that in practice tuberculosis should be eradicated on a herd basis. At whole herd tests, all stock, including bulls, over six months old must be tested. Those on runoffs in the same area shall be tested forthwith.

7. The routine for new herds is:-

   (a) Initial test

   (b) Thereafter no less than three monthly intervals until no further reactors occur.

Appendix 1E (continued)

8. Testing of Replacements: Owners and managers of town milk supply herds should be informed of their staturatory obligation to notify replacements within seven days of purchase. The administrative ruling still exists that if, for any good reason, a veterinarian is unable to test replacements within one month of the receipt of notification, the owner is entitled to Loss of Production in the event of reactors to the test. On no account must replacements be left untested, nor must the testing of replacements be delayed because of an impending test. The Veterinarian must use his discretion as to whether he utilizes to services of the Livestock Instructor for tagging replacements.

Appendix 1E (continued)

EXAMPLE NO. 5

SPECIMEN COMPENSATION CALCULATIONS

No. of Test	No. Cattle Tested	No. Cattle Tested Once	No. re-actors	Percentage	Market Value			Compensation
					£. s. d.	£. s. d.	£. s. d.	£. s. d.
1	74	74	23	31.1%	16 @ 28. 0. 0 =	488. 0. 0		
					5 @ 27. 0. 0 =	135. 0. 0		
					2 @ 25. 0. 0 =	50. 0. 0	633. 0. 0 @ 80% =	506. 8. 0
2	16	16	4	25.0%	3 @ 28. 0. 0 =	84. 0. 0		
					1 @ 26. 0. 0 =	26. 0. 0	110. 0. 0 @ 75% =	82.10. 0
3	74	11	2	18.1%	2 @ 26. 0. 0 =	52. 0. 0	52. 0. 0 @ 70% =	36. 8. 0
		101	29	28.7%	Total M. V.		795. 0. 0 Total Comp.	625. 6. 0 (a)
					Aggregation		795. 0. 0 @ 75%	596. 5. 0 (b)

Note: As the total of each individual compensation payment (a) exceeds that calculated under aggregation (b), there is no aggregation payment and the final payment is to be the amount of compensation for the last test.

Appendix 2A

DESCRIPTION OF SOILS IN THE MANAWATU DISTRICT (26)

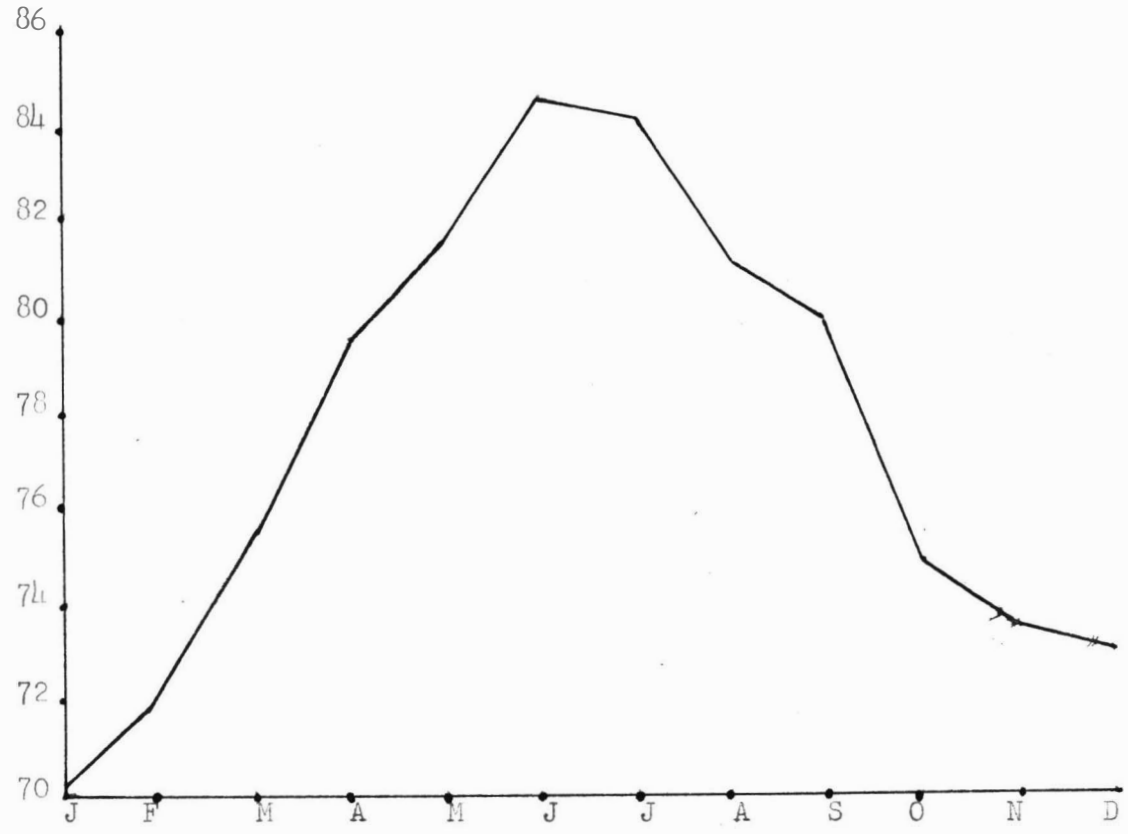
Ref. No.	Provisional Name of Soil Set	Parent Material	Soil Profile	Natural Fertility
RECENT SOILS FROM ALLUVIUM				
1	Manawatu loam, sandy loam, silt loam and clay loam	Alluvium	6-12 in. light-brown or dark grey loam, etc. on mellow brown-grey, or yellow loam and clay loam	High to very high
1c	Tukituki sandy loam, stony gravel etc.	Alluvial	Shallow brown sandy loams on stony gravel	Medium to low
2	Kairanga Silt loam and clay loam	Alluvium	6-12 in. grey silt loam on clay loam mottled grey or brown	High to very high
2a	Kairanga loam, etc. strongly gleyed types	Alluvium	3 in. grey loam on white, rust-flecked loam or 6 in. grey to dark-brown heavy silt loam, or pale greyish mottled clay loam	Low to medium
2b	Opiki Complex	Peat and Alluvium	3-8 in. brown peaty sandy loam, on black peaty loam. Also 15 in. gleyed loams on peat.	Medium
ORGANIC SOIL (Transition to Podzolic Soils)				
107	Makerua Peaty loam	Peat and Alluvium	6 in. black peaty loam, on soft loamy peat	High
YELLOW-GREY EARTHS (Transition to Podzolic Soils)				
12	Ohakea loam	Alluvium	6 in. dark-grey loam, 20 in. brownish-yellow clay loam, in sandy loam on gravel	Medium to high
13	Tokomaru Silt loam	Alluvium	6-8 in. dark brownish-grey heavy silt loam, 24 in. pale yellowish grey clay loam, on compact sandy clay loam	Medium to high

Appendix 2A (continued)

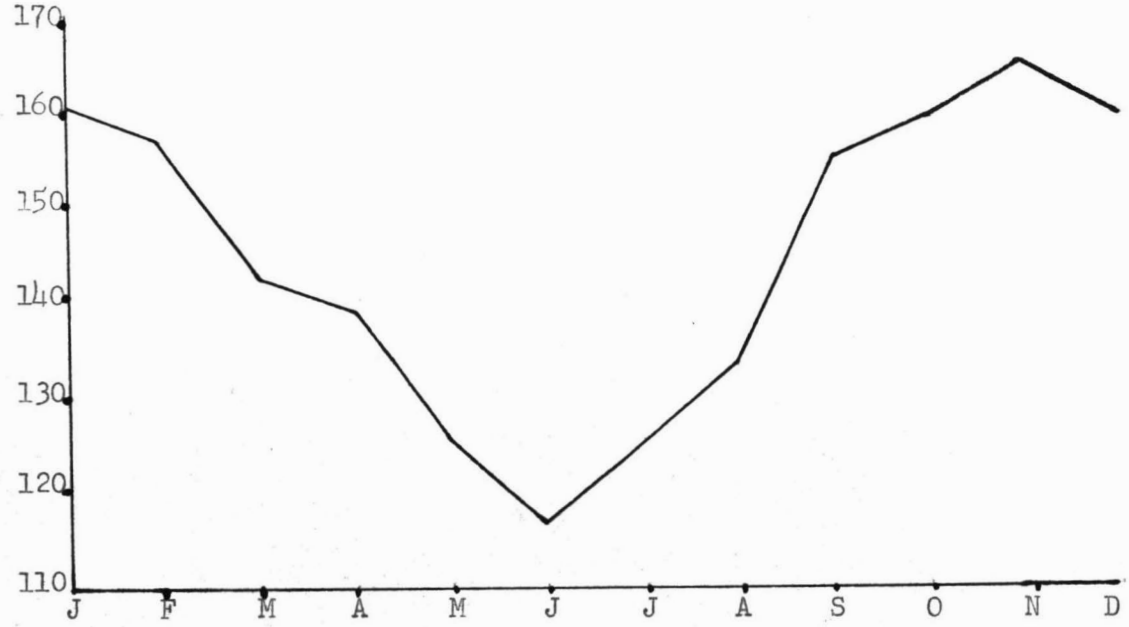
Ref. No.	Provisional Name of Soil Set	Parent Material	Soil Profile	Natural Fertility
13a	Milson silt loam	Alluvium	6 in. brownish-black silt loam 3 in. greyish-yellow heavy silt loam, 12 in. pale yellowish-grey clay loam, on compact sandy clay loam	Medium to high
13b	Holcombe silt	Sandy mudstone	6-9 in. blackish-grey silt loam, on dull pale-grey clay loam, mottled, and compact below 12 in.	Medium
13bH	Holcombe silt loam, hill soil	Sandy mudstone	similar to 13b but subsoil not compacted	Medium
YELLOW BROWN SANDS (Podzolic soils from aeolian sand)				
23	Patea sand	Grey dune sand	6-18 in. black sand on pale grey sand	Low to medium
23b	Whananaki sand	Brown and Grey sand	7-18 in. dark-brown to dark-grey sand on free brown or grey sand	Medium
YELLOW BROWN LOAMS (Takapau Suite - Immature Stage)				
76	Levin silt loam	Alluvium from Greywacke and Volcanic ash	6 in. dard-brown silt loam, on yellow-brown heavy silt loam	Medium to high
76a	Kiwitea loam	Alluvium from Greywacke and Volcanic ash	6 in. dark-grey brown loam, on yellow-brown compact heavy silt loam	Medium
76b	Kawhatau stony silt loam	Alluvium from Greywacke and Volcanic ash	3-9 in. brown stony silt loam, 6 in. yellow-brown stony silt loam, on stony gravel	Medium to low

Appendix 2B

MONTHLY MEAN RELATIVE HUMIDITY 1928 - 1956
Grassland Division, Palmerston North



MONTHLY MEAN 24 HOURLY WIND RUN IN MILES 1928 - 1956
Grassland Division, Palmerston North



Appendix 2C

AGREEMENT BETWEEN THE MANAWATU CO-OPERATIVE MILK PRODUCERS COMPANY LIMITED AND SUPPLIER

1. THIS Agreement shall commence on the First day of September, 1955, and continue in force until the Thirty-first day of August, 1956 and in the case of the supplier continuing to supply after the last mentioned date then during the period of such actual supply and until the substitution of a newly executed agreement by the supplier in lieu thereof.

2. THE Supplier agrees to supply and (upon and subject to the conditions stipulations and agreements hereinafter contained) to sell to the Company and the Company (upon and subject to such conditions stipulations and agreements) agrees to purchase during the continuance of this Agreement.....gallons of milk per day.

3. SUBJECT to compliance observance and performance by the Supplier with and of his duties and obligations hereunder the Company will pay by way of advance payments to the Supplier for the milk supplied by him to the Company in accordance with the provisions of Clause 2 hereof and during the continuance of this Agreement amounts calculated as follows:

   (a) For milk supplied during the months September to January both inclusive 22 pence per gallon.

   (b) For milk supplied during the months of February to April both inclusive 27¼ pence per gallon.

   (c) For milk supplied during the months May to August both inclusive 33 pence per gallon.

provided always that these prices shall in all respects be subject to the provisions of any statute or regulation made in pursuance of any statutory provision from time to time affecting the same.

4. ALL milk shall be placed by the Supplier at the road gate of his farm in cans well coverd and thoroughly washed and cleansed where the same shall be collected by an independent contractor for transportation to the respective depots And it is hereby declared and agreed that the Supplier shall bear any loss of milk contained in unhygienic or defective cans.

5. THE Supplier doth hereby warrant and state within the meaning of Section 8 of The Food and Drugs Act, 1947, that all milk supplied by the Supplier to the Company in the terms of this Agreement shall conform in all respects to the standard prescribed by the Food and Drugs Act, 1947, and/or any Regulation thereunder or under any other Act or Regulations passed in amendment or in substitution therefor

Appendix 2C (continued)

and for the time being in force AND if any such milk so supplied shall either before or after being collected as aforesaid be found not to be of the standard so prescribed then it shall be and be deemed to be rejected by the Company and may be disposed of by the Company as the Company shall think fit and in every such case the Company shall be deemed to act as agent for the Supplier.

6. THE Supplier shall in all respects comply with the provisions of the Dairy Industry Act, 1908, and all other Acts, Regulations or Orders lawfully made or to be made during the term of this Agreement (and having relation thereto); and with all requisitions made in pursuance of any such Acts, Regulations or Orders by any Officer or Inspector having lawful authority in the administration thereof.

7. THE Company shall be at liberty subject to mutual arrangement at any time by its Manager, servants or agents, to visit and inspect the milking sheds, cows, dairies, and utensils of the Supplier.

8. SHOULD the Supplier fail at any time to supply the quantity of milk set out in Clause 2 hereof to the Company the Supplier shall pay to the Company the sum of three-pence per gallon for each gallon short supplied up to and including 20% of the gallonage mentioned in Clause 2 hereof and four-pence per gallon for every gallon short supplied over 20% of the gallonage mentioned in Clause 2 hereof. For the purpose of arriving at the payments hereinbefore mentioned in this Clause all calculations shall be on a monthly basis. Such amounts shall be payable by the Supplier to the Company as liquidated damages and not by way of penalty, and may be deducted by the Company from any moneys from time to time payable by the Company to the Supplier and whether for the supply of milk or otherwise howsoever. Should the Supplier cease to supply milk to the Company during the term of this Agreement the Supplier shall not be entitled to receive from the Company payment for supply of milk under this Agreement at rates greater than those payable for butterfat and notwithstanding anything to the contrary contained in this Agreement.

9. THE Supplier shall place at his road gate all the milk from each milking for the next collection thereafter so that the contractor may collect same.

10. IF the Supplier shall not have placed the milk at his gate on the day at the time nominated the Contractor shall be under no obligation to collect such milk and the Supplier shall be liable to pay to the Company damages in respect of such default as set out in Clause 8 hereof PROVIDED that in any case where such default is due to any unforeseen or unavoidable circumstances the Company shall receive such milk if the Supplier shall cause the same to arrive at the

Appendix 2C (continued)

appropriate depot not later than the time at which it would have arrived if it had been collected by the contractor.

11. FOR the purposes of all calculations under this Agreement "Gallon" in relation to milk, means a quantity of milk weighing ten and one third pounds avoirdupois.

12. THE Company shall keep full records as to gallonage of milk supplied by and payments due to the Supplier hereunder and shall make such records available to the Supplier as required from time to time.

13. ALL moneys due to the Supplier for milk supplied hereunder shall be payable by the Company at its office on the 20th day of each month following collection thereof.

14. NOTWITHSTANDING anything to the contrary herein contained or implied or contained or implied in any statute, or implied by the conduct of the parties hereto, or from the circumstances of the case, the property in the milk supplied to the Company in accordance with this Agreement shall not pass to the Company until the 20th day of the month following the collection thereof, and in no case shall the property in such milk supplied under the terms of this Agreement pass or be deemed to pass where such supply fails to conform to the standard as aforesaid (save where such milk not so conforming is diverted to channels or disposed of for purposes authorised by law) AND it is hereby agreed and declared that any dealing with such milk or appropriation of the same in the ordinary course of the Company's business, or the passing of any credit therefor, or any advance payment by the Company to the Supplier shall not be deemed to alter the time of the passing of the property in such milk to the Company, or to render the Company liable in conversion or otherwise in respect of any such dealing with or appropriation thereof.

15. NOTHING herein contained shall impose upon the Company any obligations to take from the Supplier any milk beyond the daily amount above set forth.

16. AS soon as conveniently may be after the 31st day of August, 1955, the Company will prepare accounts covering the working of the Company for the period of this Agreement and if after providing for the cost of of all administration of the Company and incidental thereto and any such contingencies as the Company may think fit and the Company shall have a surplus in hand then the Company may make to the Supplier such further payment in respect of milk supplied to and accepted by the Company during the said period as the Company may think fit.

17. ALL differences and disputes which shall arise between the parties hereto touching or concerning any of the provisions of this Agreement

Appendix 2C (continued)

or any act or thing done suffered or omitted in pursuance thereof or touching or concerning the construction of this Agreement shall be referred to two arbitrators (and their umpire if they are unable to agree) under the provisions of "The Arbitration Act, 1908" or any Act passed in amendment thereof or in substitution therefor and for the time bing in force.