

Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

2

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

Massey University Library
New Zealand & Pacific Collection

Thesis presented by "546" for the Animal Husbandry
Section of the M.Agr.Sc. Degree

D. S. Flux

INDEX

SECTION I

INTRODUCTION	1
FEATURES OF THE MARKET MILK TRADE	3
SOME PROBLEMS INVOLVED IN LEVEL MILK PRODUCTION	4
DEMAND FOR MILK IN AUCKLAND CITY	6
AUCKLAND MILK BOARD	7
CONTRACTS	8
ZONES OF SUPPLY	10
METHOD OF COLLECTING DATA	15
FARMS IN THE SURVEY	19

SECTION II

FARMERS' OBJECTIVES	27
SPREAD OF PRODUCTION	28
Factors Affecting Spread of Production	30
Enforcement of Contracts	30
Payment for Town Milk	34
Proportion of the Herd in Milk	37
Calving Dates	39
Standard of Feeding Over the Year	42
Feeding Methods	57
Rate of Stocking	68
Labour	70
PRODUCTION PER ACRE	79
Factors Affecting Per Acre Production	80
Breed Used	80
Production Per Cow	82
Purchase of Feedstuffs	83
Spread of Production Over the Year	84
Pasture Management	85
Labour	86
Herd Maintenance and Improvement	87

SECTION III

MILK QUALITY CONSIDERATIONS	96
-----------------------------	----

SECTION IV

DISCUSSION	101
CONCLUSION	107
APPENDIX I	112
APPENDIX II	122
REFERENCES	123

SECTION I

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

INTRODUCTION

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

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

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

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

increasingly important.

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

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

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

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

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

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

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

FEATURES OF THE MARKET MILK TRADE

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

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

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

SOME PROBLEMS INVOLVED IN LEVEL MILK PRODUCTION

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

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

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

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

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

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

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

DEMAND FOR MILK IN AUCKLAND CITY

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

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

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

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

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

THE AUCKLAND MILK BOARD

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

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

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

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

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

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

CONTRACTS

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

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

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

Allowed Surpluses

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

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

Arrangement of Contracts.

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

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

ZONES OF SUPPLY

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

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

Physical Conditions Affecting Production in the Surveyed Area

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

Soil Types

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

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

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

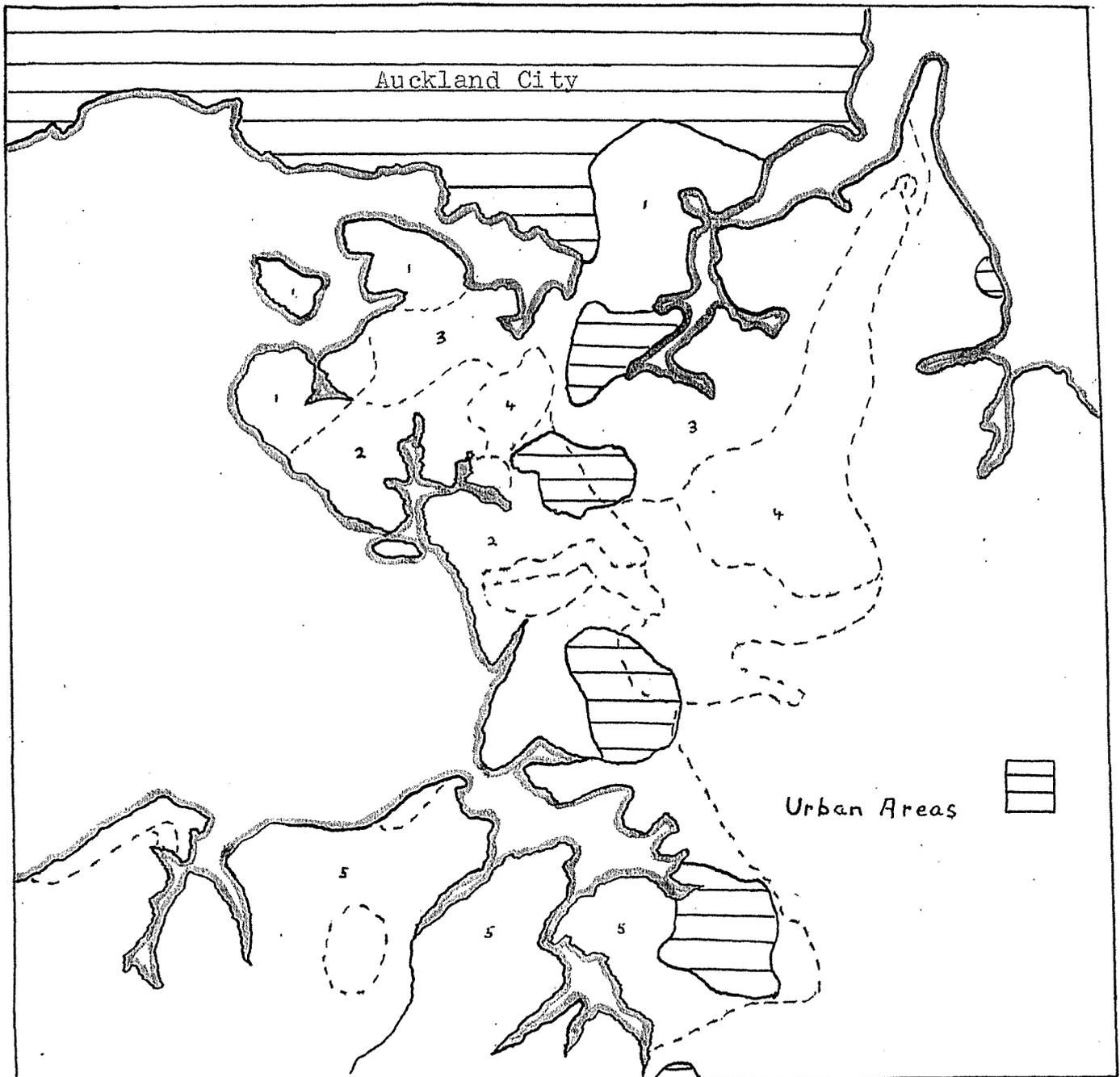
Type 1 was derived from basalt and scoria. This is a fertile type of soil, free draining, but drying out badly in dry weather.

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

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

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

SOIL TYPES IN AREA COVERED
BY THE SURVEY



LEGEND

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

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

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

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

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

Climate

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

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

Graph A¹¹⁴ shows (a) the monthly rainfall for the period covered by the survey (b) the number of rainy days per month for the same period.

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

TABLE 1

	Mean Maximum and Minimum Temperatures (Degrees F.)					
	1944		1945		1946	
	Mean Max.	Mean Min.	Mean Max.	Mean Min.	Mean Max.	Mean Min.
Jan.	R73.8	50.3	72.2	60.3	P72.3	54.4
Feb.	74.5	69	73.2	60.3	75.5	61.5
March	71	59.2	P70	53.2	71.8	55.8
April	66.7	56.9	P66.4	51.9	67.6	53.2
May	61.4	49.6	P59.6	45.9	63.9	54.1
June	54.9	47	54.0	44.6	59.3	50.3
July	R57.8	38.8	P55.8	41.6	59	48.7
Aug.	56.2	46.9	59.5	49.9	58.4	48.2
Sept.	58.2	48.4	60.1	49.3	61.6	49.3
Oct.	62.3	52.3	P60.7	45.6	62.7	51.2
Nov.	P65.77	49.8	P66.4	51.1	62.9	47.5
Dec.	67.6	55.1	67.8	54.1	66.9	55.6

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

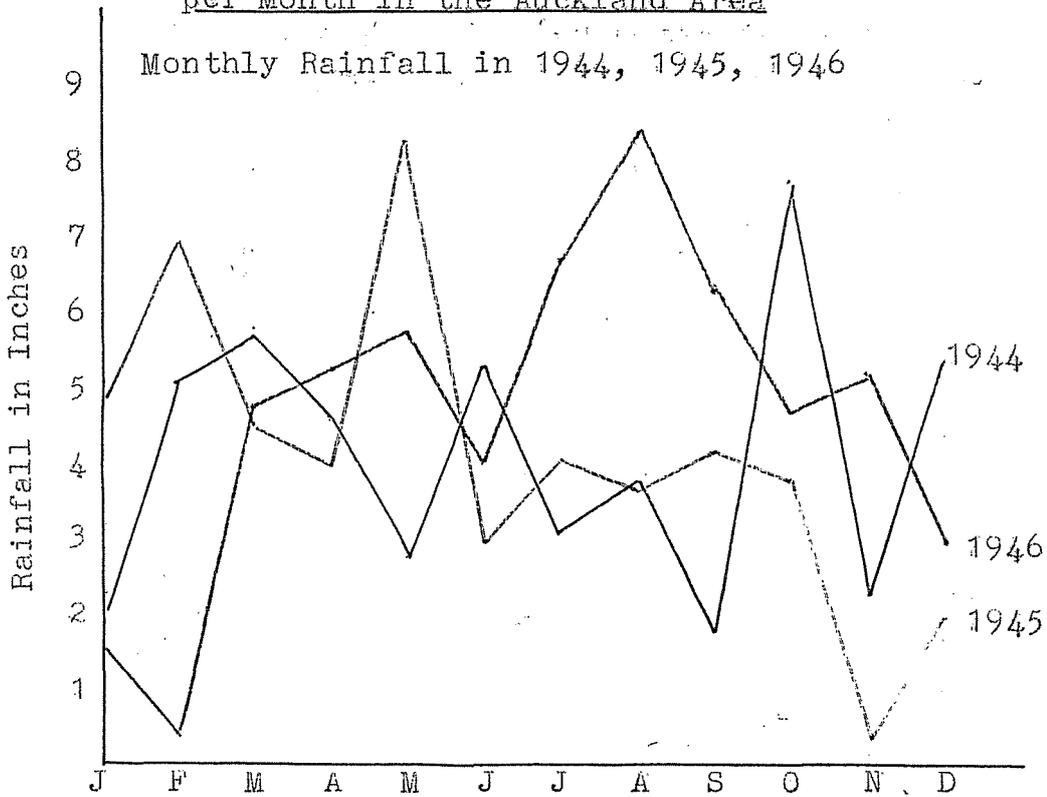
TABLE 2

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

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

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

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



Number of Rainy Days per Month 1944, 1945, 1946

