A STUDY OF FACTORS

HINDERING INCREASED

PRODUCTION ON THE

RANGITAIKI PLAINS AND

IN GALATEA

by

M.B. CRONIN

Thesis Presented in Partial Fulfilment

of the Requirements for the

Degree of Master of Agricultural Science

in Massey University

Palmerston North

January, 1968.

ACKNOWLEDGEMENTS

The author wishes to thank Professor W.V. Candler, ex-Professor of Agricultural Economics and Farm Management, for his guidance and encouragement in this study.

Thanks are also extended to Messrs R.W. Cartwright, J.N. Hodgson, and A.H. Hughes of the Agricultural Economics and Farm Management Department for helpful discussions with the author.

The ready and willing co-operation of the survey farmers is gratefully acknowledged.

Many people in the survey district gave willing assistance and encouragement to the author during the survey and this is gratefully acknowledged. In particular the author would mention the local extension officers who assisted with the selection of the survey farms, and with whom the author had many helpful discussions.

Special thanks are also extended to Mr S. Spence, Chairman of Directors, and Mr R. Dennis, General Manager of the Rangitaiki Plains Dairy Company, and to the Directors and Staff of the Company who showed considerable hospitality to the author as well as much assistance and encouragement in the survey.

Financial assistance from the Rangitaiki Plains Dairy Company, Potash (N.Z.) Ltd., and a scholarship from the Bank of New South Wales are also acknowledged.

Finally thanks are recorded to Mrs M. Clifford and Miss A. Mackay who typed the thesis, and to the library staff of Massey University for their help in obtaining references.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 Summary

This chapter gives a brief outline of the purpose of this study of the Rangitaiki Plains and Galatea. The population of farms from which the survey sample was taken is defined, and a thesis guide is given.

1.2 The Purpose of the Survey

Prior to this survey some farmers on the Rangitaiki Plains and in Galatea were making large increases in butterfat production by following a pattern of higher stocking rates, and increased rates of application of fertilizer, together with the required complementary inputs. It was noticed, however, by the district extension officers, and officials of the Rangitaiki Plains Dairy Company that many other farmers were remaining static in production.

This study consisted of a survey of 37 dairy farms selected from this district, and was aimed to firstly evaluate, both physically and financially, development projects on progressive farms, and secondly to investigate the factors which were hindering other farmers from increasing production, and to find ways of overcoming these problems.[1]

---

1. The objectives of the survey are fully outlined in Section 4.2.

1.3 The Population Studied

This study was restricted to suppliers to the Rangitaiki Plains Dairy Company which is the only dairy factory operating in the Rangitaiki Plains district. Included in this district is the Whakatane river valley and Galatea. The total area is approximately 85,000 acres of intensive dairying land.

This survey was commenced in November 1965, and hence selection of the survey farms was made from the 646 suppliers in the 1964/65 season.[2/]

1.4 Thesis Guide

This section outlines the contents of the remaining chapters in the thesis.

Chapter 2 gives an outline of the farming environment and services on the Rangitaiki Plains and Galatea. A review of the literature on farm surveys and their uses is given in Chapter 3. Chapter 4 discusses in detail the objectives of this survey, the selection of the survey farms, and the survey method.

Chapter 5 discusses farming on the survey farms and outlines the major types of farming encountered in this survey. In Chapter 6 various aspects of evaluating the profitability of farm development are discussed and 5 case farm studies are given to show the profitability of development on the survey farms.

---

2. The method of selection of farms is discussed fully in Section 4.3.

The survey results are reported in Chapters 7 and 8. This includes discussion on family situations and attitudes related to development, the local extension officers views of needed husbandry changes for increased production, and the factors which the author considers are actually hindering increased production on the survey farms. Chapter 9 gives the authors recommendations for overcoming the factors which he considers the survey has demonstrated to be hindering increased butterfat production, and Chapter 10 gives a summary and conclusion to the thesis.

CHAPTER 2

FARMING ON THE RANGITAIKI PLAINS AND IN GALATEA

2.1 Summary

This chapter gives an outline of the farming environment and services on the Rangitaiki Plains and in Galatea. It shows the location of the survey district, and discusses the history of the dairy company and farming in the area. The soils, climate and topography are discussed, and production statistics for the district are given. The chapter concludes by mentioning the extension services provided in the district, and the use of group farm labour schemes.

2.2 Location

Figure 2.1 of the North Island of New Zealand shows the location of the survey district. Figure 2.2 is an enlarged map of the survey district showing settlements and the survey farms.

2.3 Historic Development

2.3.1 History of farming on the Rangitaiki Plains

In its natural state the Rangitaiki Plains, an area of about 85,000 acres, was largely swamp. Very little successful settlement was made in the district prior to 1900. In 1902 the settlers realised that a concerted and comprehensive effort had

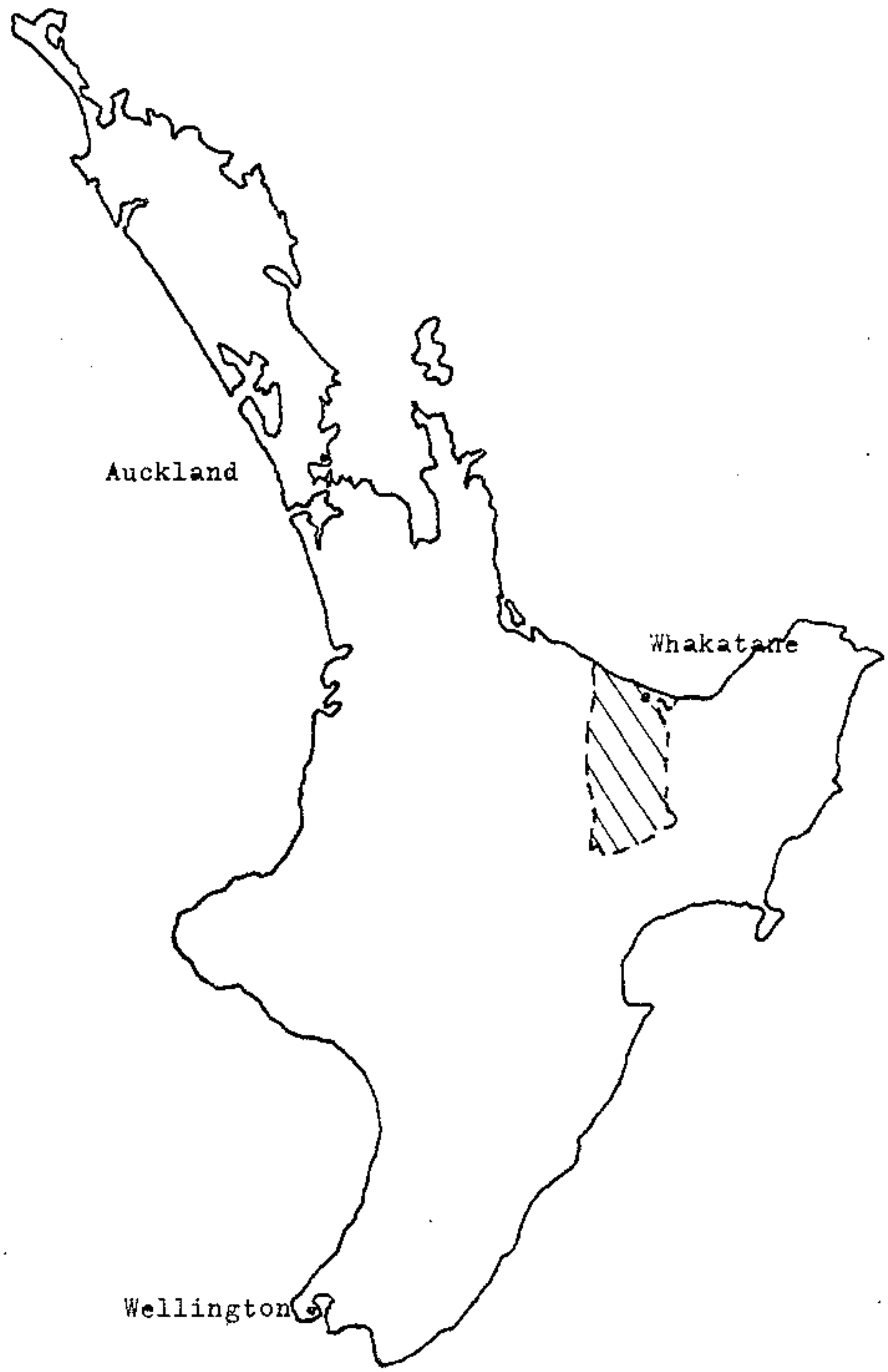

Figure 2.1 North Island of New Zealand Showing the Whakatane County

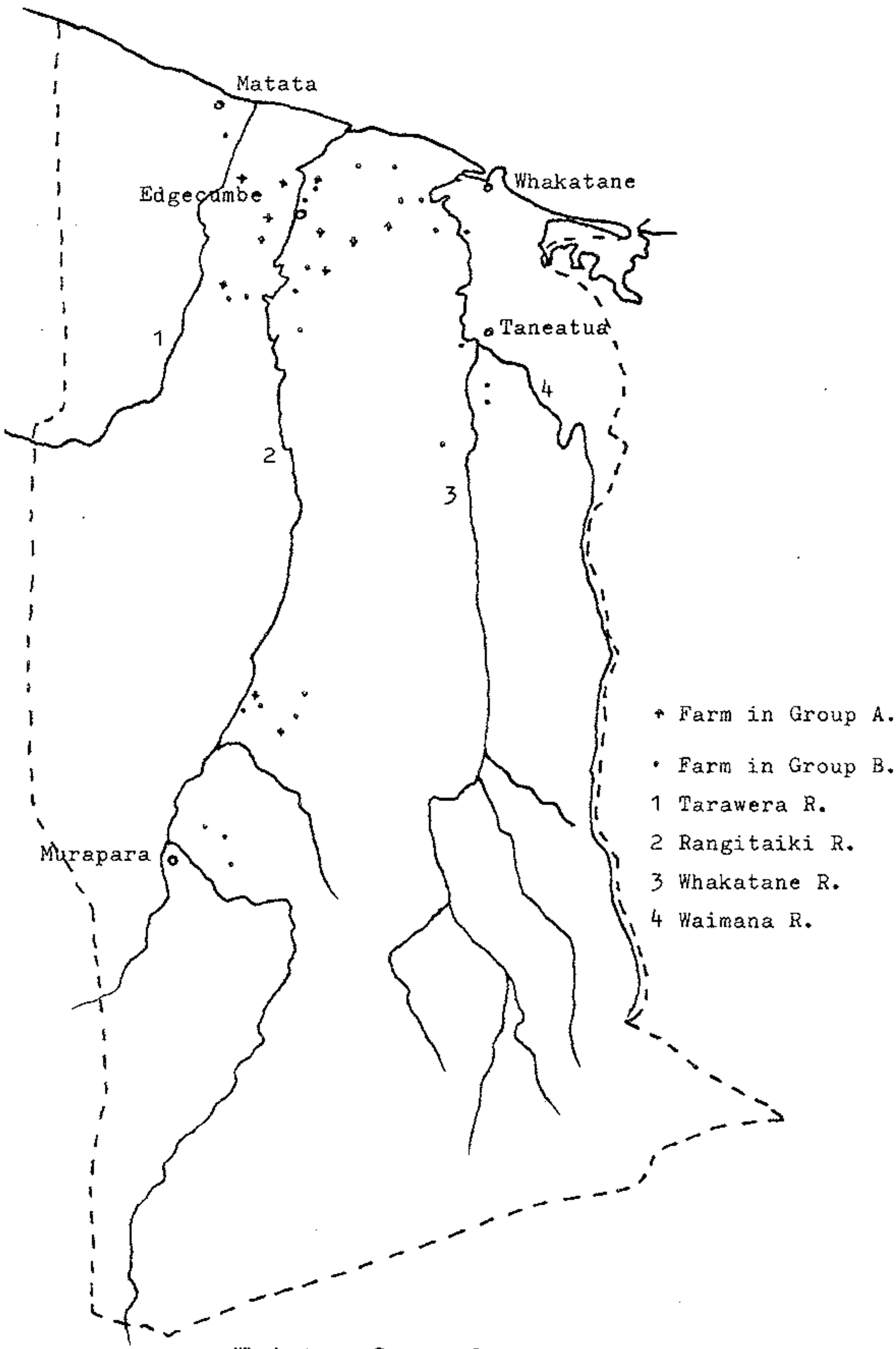

Figure 2.2 Whakatane County Showing the Survey Farms

to be made towards drainage, and a Drainage Board was formed. A report was prepared which showed that the drainage was a problem of river control. Originally the Rangitaiki river approached to within a mile of the sea at Thornton and then turned both east and west using the Orini and Awaiti streams to link up with the Whakatane and Tarawera rivers, by which it entered the sea. Some settlers realised that a mouth could be cut for the Rangitaiki river from Thornton to the sea. The direct outlet to the sea for the Rangitaiki river was completed in 1914, following the passing of the Land Drainage Act of 1910, and enabled successful steps to be made towards draining the Plains.

Dairy farming has always played a significant role in the production from the Rangitaiki Plains. A cheese factory was operating in 1912 on the Hallet Estate, and the Rangitaiki Plains Dairy Company was established in 1915 as a cheese factory at Awakeri. Many early settlers in the area were, however, essentially beef cattle men. Flax farming was also important for some years.

The Whakatane Freezing Works was opened in 1917, but went into liquidation within a few years, with considerable losses to the men who had guaranteed it.

Since this time the district has gradually developed into an intensive dairying district.

2.3.2 History of farming in Galatea [1]

The Galatea basin is about 33,000 acres in area. Farming commenced here about 1869 when Mr Troutbeck obtained 22,000 acres from the Maoris on which he tried to introduce English grasses, and reared sheep, cattle and horses. This was continued by Mr Grant until 1914. The river flats were not cobalt deficient, and hence the run as a whole was free from bush-sickness.

The Galatea Run was taken over by the Crown in the thirties and developed for dairy farm settlement. The southern end of the basin was settled with farmers rehabilitated after the first world war, and the northern end settled after the second world war. After some initial setbacks, due largely to pasture failure on droughty soils, some 150 dairy farms were established.

2.3.3 History of the Rangitaiki Plains Dairy Company

The Rangitaiki Plains Dairy Company commenced operations as a cheese factory at Awakeri in 1915. After three and a half years successful operation it was realised that to serve

---

1. Information for this section was obtained from: Department of Scientific and Industrial Research, "Soils, Forestry and Agriculture of the Northern Part, Kaingaroa State Forest and the Galatea Basin", Soil Bureau Bulletin 18, 1960, p.18: and, Vaile, E.E., "Pioneering the Pumice", Whitcombe and Tombs Limited, Wellington, 1939, p.41.

the district's growing requirements, a change to butter manufacture with a cream collection service was required. This changeover took place in 1920. In 1923 a new, more central, butter factory was built at Edgecumbe. In 1927 cream was first received from Galatea by the Rangitaiki Plains Dairy Company.

A number of other small dairy companies were established in the period 1912-1925, some went into liquidation, and from 1928 on, the remaining companies amalgamated with the Rangitaiki Plains Dairy Company.

2.4 Soils

2.4.1 Soils on the Rangitaiki Plains

The Rangitaiki Plains may be:

> "regarded as drowned dunelands partly buried by fans built up by the Rangitaiki and Tarawera rivers, and east of the former river, belts of dunes are separated by swales of peat." 2/

The parent material on the plains comprises fine pumice alluvium, peat, dune sands, and Tarawera Ash. On the hills in the south the parent material is largely Tarawera Ash, and in the east and west a composite of Tarawera, Kaharoa, Taupo and Whakatane ashes.

This variation in the parent materials and the method of formation of the soils on the Rangitaiki Plains means that there is a wide variety of soil types in the district. Many of these

---

2. Pullar, W.A., Vucetich, G.G., Hewitt, S.R., McLean, I., Unpublished Report for Soil Survey Conference, Whakatane, 1965.

soil types however, have only slight textual differences between them.

For the purposes of this survey the only relevant soil classification is one based on productive potential of the land.[3/] After discussion with Hewitt[4/] and Pullar[5/] the author divided the soils on the Rangitaiki Plains into four groups according to productive potential. Table 2.1 gives, for each soil group, the included soil types,[6/] the top production obtained in the 1964/65 season,[7/] and the approximate total acreage of farms supplying the Rangitaiki Plains Dairy Company within the group.

2.4.2 Soils in Galatea

The formation of the soils of the Galatea basin has been described as follows:

> "Kaharoa ash deposits form the soils on high terraces and portions of the fans while sediments of mixed origin form soils on outwash fans and on flood plains. The latter sediments include varying amounts of greywacke gravel, sand and silt, weathered ash from old ash beds and Kaharoa and Taupo ashes. The properties of the soils vary accordingly."[8/]

---

3. For comments on aggregation see: Heady, E.O., "Economics of Agricultural Production and Resource Use", Prentice-Hall Inc., New Jersey, 1951, Chapter 10.
4. Hewitt, S.R., Farm Advisory Officer, Department of Agriculture, Whakatane.
5. Pullar, W.A., Soil Bureau, D.S.I.R., Whakatane.
6. Soil types are according to Pullar, W.A., et.al., Op.cit., or from Pers. comm. with Pullar, W.A..
7. Top production figures for each soil group are according to Pullar, W.A., et.al., Op.cit..
8. Department of Scientific and Industrial Research, Op.cit., p.31.

Table 2.1 Grouping of the Soils on the Rangitaiki Plains According to Productive Potential

Soil Group number	Soil types included	Top production 1964/65 lb butterfat/ac.	Approximate total acreage
1	Orini Sand	240	9,000
2	Tarawera gravel Omehu sandyloam Awakeri loamy sand over gravel	320	17,000
3	Awakeri loamy sand on peat phase Pongakawa sandy peat Matata loam	390	9,000
4	Paroa silt loam on sand Paroa silt loam on peat Opouriao silt loam Paroa loam Opouriao grey loam Paroa mottled silt loam	485	28,000

Table 2.2 gives a classification of the soils in the Galatea basin according to productive potential as mentioned above.[9/]

---

9. Soil types are according to the Soil Bureau, Ibid, pp. 31-34.

Table 2.2 Grouping of the Soils in the Galatea Basin According to Productive Potential

Soil Group number	Soil types included	Top Production 1964/65 lb.butterfat/ac.	Approximate total acreage
1	Galatea sand Galatea sand sloping phase Galatea mottled sand	240	16,000
2	Horomanga sandy loam Horomanga sand	320	5,000
3	Rangitaiki sandy loam and silt loam	390	1,000

2.4.3 Discussion of the main soil characteristics in each soil group[10]

2.4.3,1 Soil Group 1

These soils are light and droughty. The droughty properties are produced by a layer of loose pumice gravel underlying the thin topsoil. The topsoil is poorly supplied with plant nutrients. The contour is generally flat, and the predominant use of these soils is for dairying. On the west of the Galatea basin however, there are exotic forests, particularly where the contour starts to slope. The droughty nature of these soils means that it is difficult to establish good ryegrass-clover pastures, and farmers lean heavily on lucerne stands to maintain milk production.

---

10. The information for this section has been gathered from Pullar, W.A., et.al., Op.cit., and the Soil Bureau, Op.cit.

2.4.3,2 Soil Group 2

The topsoil of the Horomanga soils has a content of fine silt and clay particles in addition to sand, and hence has a better developed structure than the Galatea sand. Moisture is also better retained in these soils due to the greater total thickness of sandy loam and sands over the droughty pumice gravel. The chemical properties of these soils show higher levels for calcium, magnesium, and potash, but the phosphate status is low. A layer of high fertility can be built up on these soils. This means that their tendency to droughtiness can be overcome by a vigorous sward which prevents the loss of moisture through evaporation from the soil surface and over-heating of the soil. Most of this land is flat, but some is hummocky.

2.4.3,3 Soil Group 3

The soils in this group are of medium to high fertility. Although they may have some tendency to droughtiness they generally need open drains to keep the winter water table down. Provided this is done, pugging is not a problem on these soils. This land is flat and is used mainly for dairying.

2.4.3,4 Soil Group 4

Most of the soils in this group were formed by flood layers intercalculated with peat layers. These soils are generally of fairly high natural fertility, and with adequate draining are capable of very high production. Most of this land is flat and low lying and consequently has to have surplus ground water pumped off. The main usage is for dairying.

2.5 Climate

The following Tables, 2.3, 2.4, and 2.5 show the main climatological information for the district for the last 5 years.[11]

The rainfall is generally fairly well spread throughout the year although the summer rain is often inadequate to keep pastures growing in Galatea. In this area frequent rain is required because of the free draining nature of the soil.

Table 2.3 Total Annual Rainfall - Inches

Recording station	1962	1963	1964	1965	1966	5 year mean
Whakatane	76.73	38.81	54.48	47.92	53.84	54.36
Waimana	102.89	57.69	73.20	65.11	81.98	76.17
Galatea	73.11	44.27	48.63	54.14	57.26	55.48

In the early autumn of 1964, 1965, and 1967 there was major flooding on the Rangitaiki Plains and in the Whakatane and Waimana river valleys. These floods caused considerable damage to pastures and fences, but stock losses were light. The heaviest total loss

---

11. Information for these tables was obtained from "Extracts from New Zealand Gazette", and by Pers.comm. with the New Zealand Meteorological Service, Wellington.

of dairy stock was 53 yearlings around Taneatua in the 1967 flood.

The Bay of Plenty Catchment Commission studied the flooding problem, and designed a scheme to provide security to the Borough of Whakatane and some 20,000 of the must vulnerable acres of the Rangitaiki Plains, from floods up to 100 year frequency.[12/] The building of this scheme was in progress during the time of this survey.

Table 2.4 Annual Temperatures for Whakatane in Degrees Fahrenheit

Temperature	1962	1963	1964	1965	1966	5 year mean
Mean of minimum month	49.1	48.4	49.2	46.3	47.9	N.A.
Mean of maximum month	69.3	67.9	66.3	67.2	66.8	N.A.
Annual mean	58.8	57.4	56.9	56.1	56.1	57.1
'N.A.' indicates 'not applicable'						

Table 2.5 Total Bright Sunshine Hours

Recording Station	1962	1963	1964	1965	1966	5 year mean
Whakatane	2243	2310	2302	2447	2494	2359

12. Bay of Plenty Catchment Commission, "Whakatane River Major Scheme", Unpublished Report.

2.6 Topography

The Rangitaiki Plains is slightly hummocky. About 12,000 acres are a little below sea level. Proceeding from the coast southward, there is a gradual rise in attitude to eight feet above sea level at Edgecumbe, thirty feet at Te Teko, and fifty feet at Awakeri. The Galatea basin has an east-west fall from 700 feet to 500 feet, and Murupara is situated at 600 feet above sea level. In general the entire area of farms in the survey area can be cultivated by wheel tractor, and for farms with an adequate outlet, drainage does not present a problem.

2.7 General Farming Statistics

In the 1965/66 season there were 684 suppliers to the Rangitaiki Plains Dairy Company. These were spread over an area of approximately 85,000 acres, and milked approximately 66,000 cows. These cows produced 19,296,483 lb butterfat of which 15,415,227 lb. was supplied as whole milk and 3,881,256 lb was supplied as cream. This represented a 5 per cent increase over the previous years production of 18,343,278 lb. butterfat of which 10,539,392 lb. was supplied as whole milk and 7,803,886 lb. as cream.

2.8 Extension Services

The extension services on the Rangitaiki Plains and in Galatea at the time of this survey were provided by Department of Agriculture Farm Advisory Officers, a Dairy Board Consulting Officer, and Farm Improvement Club Advisory Officers. These extension officers provided an advisory service which included the use of individual contact, group media, and mass media.

There are two Department of Agriculture Farm Advisory Officers stationed in Whakatane who serve the Rangitaiki Plains and surrounding districts. There are also two Department of Agriculture Farm Advisory Officers stationed at Rotorua who serve that district and Galatea.

There is one Dairy Board Consulting Officer stationed in Whakatane who serves all the suppliers to the Rangitaiki Plains Dairy Company as well as the surrounding districts.

Table 2.6 gives an outline of the available extension services from Farm Advisory Officers of the Department of Agriculture, and the Consulting Officer of the Dairy Board to suppliers to the Rangitaiki Plains Dairy Company.

Table 2.6 Available Extension Services to Suppliers to the Rangitaiki Plains Dairy Company

Extension service	Total holdings to service Dairy	Sheep	Farms supplying R.P.D.C. in district	% of total holdings supplying R.P.D.C.	Number of extension officers	Extension units[1] to spend with suppliers to R.P.D.C.
Dairy Board	2000	Nil	680	34	1	0.34
Dept. Agric. Whakatane	900	400	530	40	2	0.80
Dept. Agric. Rotorua	510	510	150	12	2	0.29
					Total	1.43

[1]Extension unit defined as 1 officer working a 40-hour week.

Assuming an even proportioning of the extension officers time amongst all farmers in their districts, Table 2.6 shows that there is an equivalent of 1.43 extension officers available to suppliers of the Rangitaiki Plains Dairy Company from government and industry sources.

The Department of Agriculture Farm Advisory Officers are, however, responsible for many duties other than direct on the farm advisory work. Thus, the author would estimate that the total time available from Dairy Board and Department of Agriculture extension officers to suppliers to the Rangitaiki Plains Dairy Company, for advisory work, is about one full time extension officer.

The Whakatane Farm Improvement Club, which has 80 members, employs two advisory officers. There are 57 suppliers to the Rangitaiki Plains Dairy Company in the Farm Improvement Club.

Thus, for individual contacts with extension officers 57 suppliers to the Rangitaiki Plains Dairy Company are using 1.5 extension officers in the form of Farm Improvement Club Advisors, as well as using some services from the Department of Agriculture Farm Advisory Officers and the Dairy Board Consulting Officer. The remaining 588 suppliers in 1965/66 had about one extension officer available to them for all forms of extension.

Specialised information is available on drainage from the Department of Agriculture Farm Engineering Officer stationed in Hamilton.

The Rangitaiki Plains Demonstration Farm, established by the Rangitaiki Plains Dairy Company in 1965, provides a group extension service.[13/] Monthly field days have been held during the 1966/67 season at which about 50 farmers have attended. Information on progress and future plans on the Demonstration Farm is supplied to all suppliers to the Rangitaiki Plains Dairy Company by means of a monthly newsletter.

Mass media used for extension purposes in the Rangitaiki Plains district includes weekly articles in the Whakatane Beacon; articles in the New Zealand Herald; Farming Journals such as Straight Furrow, The New Zealand Exporter, The New Zealand Farmer, and The New Zealand Journal of Agriculture. There are radio farming broadcasts daily at 12.30 p.m. from the national stations, and two programmes weekly from 1-Z.D. Tauranga. 'Country Calendar' once a week on television provides another extension service. Farmer conferences, such as the annual Ruakura Farmers Conference, and the less regular local conferences in Whakatane and Galatea, also provide a means for extension.

2.9 Group Farm Labour

During the past twenty years there have been at least six group farm labour schemes working on the Rangitaiki Plains. To the author's knowledge only one group was working during the time of this survey. This group consisting of 26 farmers and 1 labourer, is situated at Thornton. The labour is balloted twice a year, however, harvesting needs take precedence over everything else. Group farm labour schemes have not proved particularly successful in this district.

---

13. For a description of this farm see: "Rangitaiki Plains Demonstration Farm", The New Zealand Farmer, July 15, 1965, pp. 10-11.

CHAPTER 3

FARM SURVEYS

3.1 Summary

This chapter briefly reviews the literature on farm surveys. It summarizes the development of farm surveys, and discusses the various types of surveys used today. The uses and limitations of farm surveys are mentioned, particularly with respect to their use in research and policy-making.

3.2 Introduction

Farm surveys involve the collection and analysis of data from farms. This information may then be used for farm recording studies, project evaluation, evaluation of new farming technology, or the study of factors hindering increased production.

Candler has emphasized the importance of farm surveys when he stated:

> "Farm surveys may be the best, indded the only way of collecting information on the success of new practices at the farm level." 1/

3.3 Development of Farm Surveys

Wesney 2/ has adequately dealt with the history of the development of farm surveys which is essentially a phenomenon of the

---

1. Candler, W.V., "Production Economics and Problems of Animal Production", Proceedings of the New Zealand Society of Animal Production, 22, 1962, p.142.

2. Wesney, D., "A Study of the Financial Returns to Process Pea Growers in Hawke's Bay", Unpublished M. Agr. Sc. Thesis, Massey University of Manawatu, 1964, Chapter 2.

twentieth century.

In summary, farm surveys developed from interest in the primary question, "What are the practices followed by successful farmers?" This question could only be fully answered by the farmers themselves and gave rise to three major developments:

(i) The Cornell Cost Studies, the first of which was published in 1902.

(ii) The Minnesota Cost-route Studies which started to gain popularity in 1906.

(iii) The use of farm account books which became important about 1916.

The above studies emphasized the analysis of individual farms. A trend away from this developed with Warren's work at Cornell in which there was an effort to reduce the cost of obtaining information.

In 1914 Warren published "Agricultural Surveys" and formulated the basic ideas of surveys.

In 1917 the British published their first cost studies.

From 1920 onwards farm surveys gained popularity in the United States, but cost-routes and farm account books were still used. The United States emphasis was directed towards determining "methodologies" for farm management research after 1928.

During the thirties the British developed the system of farm record collection by farm surveys, which, after 1945 gave way to the development of the farm standards approach.

3.4 Farm Survey Methods in Current Use

Farm record surveys and interview surveys are the two main types of farm surveys in current use.

3.4.1 Farm record surveys

Farm record surveys have a purely descriptive aim. Records may be collected to describe some aspect of farming (say the distribution of farm wages) or hopefully, to describe successful farming. The records may be collected by interview, by mail, or by telephone.

The authors of the survey feel that they need more information about a particular topic without any very clear idea as to who will use this additional information, or for what purpose it will be used.

> "There is no hypothesis to be tested, nor are there any very clear guide lines as to what information should be gathered, or how the information once gathered should be arranged. 3/ 4/

As there is no hypothesis, there is no way of telling which information is pertinent. The people responsible for the survey should, however, check to ensure that the survey is in fact necessary, and they must bear in mind that the information is useless unless it is used by someone.

---

3. Candler, W.V., "The Role of Farm Management Surveys", Discussion Paper No.39, Department of Agricultural Economics and Farm Management, Massey University of Manawatu, 1965, p.4.

4. Note this approach conflicts with Warren's statement of the importance of defining the purpose of a farm survey: Warren, G.F., "Agricultural Surveys", Cornell Agricultural Experiment Station Bulletin 344, 1914.

The use of descriptive survey data for analytical purposes for which it is not designed is likely to be difficult, and may be misleading. A possible example of this would be to collect descriptive data on fertilizer usage and butterfat production. Such figures, if assembled in the form of a two way table, may show that some farms at high levels of production use only a low rate of fertilizer application. If, from such results, a recommendation is made to farmers that high levels of fertilizer are not required for high levels of production, this could be very misleading. Such a conclusion makes no allowance for the large number of other variables which affect the level of production, and current "high" levels of production might be capable of being exceeded with high fertilizer applications.

Simple record collection is likely to imply an almost total disregard for the research worker's technical knowledge of agriculture.

Occasionally such records are used as a basis for "guides to successful farming" in the area. This assumes that records from, say 50 farms in an area, can indicate the way to successful farming in the region, even though no knowledge of agriculture is required to collect, analyse, or interpret the data.

The use of farm records for analysis without reference to the farm on which they were collected has been criticised by Candler[5/] and Dudman.[6/] Farm record surveys can, however, be useful in

5. Candler, W.V., "Production Economics and Problems of Animal Production", Op. cit., p.142.

6. Dudman, R., "The Methodology of Research in Agricultural Economics", Journal of Agricultural Economics, 15, 4, 1963, p.572.

exploratory studies.[7]

It has been said that farm record surveys involve finding out facts _about_ farmers; the next type of survey, the interview survey, has been described, in contrast, as endeavouring to find out facts _from_ farmers.[8]

3.4.2 Interview surveys

Farm record surveys may or may not involve studying the whole farm as a unit. In interview surveys, the survey worker is concerned to study the whole farm and consequently be able to see the various resource interactions. Information is collected on both quantitative and subjective data.

Salter has much to say in making the plea for whole farm studies. He states that the individual attributes of a farm are not important in themselves but only in so far as their combination within the whole unit helps to explain the behaviour of it. He continues:

> "The most common procedure used in rural social studies is to summarise a mass of field schedules by a cross-sectional process of describing first one attribute and then another, or perhaps a couple of attributes at a time, as these are found among all the schedules or among large a priori groups of schedules. The most vulnerable aspect of this cross-sectional procedure is that it deflects the line of perception of the research worker away from the case or action unit and tends to make it impossible for him or his audience to see the pattern of behaviour which

---

7. Ward, A.B., "The Use of the Telephone as a Survey Method. Some Preliminary Results", Discussion Paper No.45, Department of Agricultural Economics and Farm Management, Massey University, 1967.

8. Candler, W.V., "The Role of Farm Management Surveys", _Op.cit._, p.11.

he is supposed to be revealing."[9/]

Where the survey worker is trying to learn from farmers he is frequently concerned to find the innovating farmer and to study unusual features of the farm. In this case the averaging of large samples, as Warren did, would be totally inappropriate.

Interview surveys normally involve a free-form interview. It should start with a walk over the farm, and naturally takes much longer[10/] than most questionnaire type interviews. The number of farms which can be reasonably handled is limited to, say, 40 farms.

This limitation may be due to the time available for the survey, or to the number of farms the research worker can hope to visualize clearly when interpreting his results. This later argument for a small sample is the most important as the research worker must be able to visualize the farm and farmer when examining the records of the interview, possibly months later, when he is in a better position to appreciate the significance of comments made by the farmer.

It is impracticable for there to be more than one survey worker in an interview survey because subjective corrections have to be made by the survey worker to the data obtained. These corrections would involve too much time comparing between survey workers, if more than one worker was involved.

---

9. Salter, L.A., "Cross-Sectional and Case-Grouping Procedures in Research Analysis", Journal of Farm Economics, 24, 1942, p.792.

10. One day per farm is typical.

The intensive type of interviewing involved means that it is essential that the interviewer be a properly trained agriculturalist familiar with the management of the type of farm being surveyed. It is up to him to notice any exceptional comments made by the farmer, or exceptional practices used on the farm, and in questioning to follow up these leads.

Selection of farms for interview surveys should be based on appropriate criteria to ensure farms are selected which can provide the required information.

There are three main types of interview surveys which may be considered. These are research or pre-release surveys, post-release or early adoption surveys, and non-adoption or behaviourist surveys.

3.4.2.1 Research or pre-release surveys

Pre-release surveys are designed to see whether there is a "market" for a new product or management practice. The survey worker has a definite change in farming practice in mind, but as yet nobody ~~has~~ made the change. In the survey the research worker would study existing management systems, and then attempt to synthesise a picture of the appropriate management system or extension services required for the suggested change in farm practice.

A pre-release survey on practices which would involve substantial farm investment for adoption is likely to give a high return on the investment in the survey, by making possible considerable improvement in farmers' investment decisions.

Pre-release surveys have been made by Frampton [11/] and Williams. [12/]

3.4.2,2 Post-release or early-adoption surveys

The aim of an early adoption survey is to study farmers' experience with a new practice.

These surveys must be done after some farmers have adopted the new practice, but before the bulk of farmers have made the change. The timing of this type of survey is important. It can only be conducted after some farmers have had practical experience which can be drawn on, but if the findings are to be useful, it is necessary that many farmers still have to decide whether to adopt the new practice.

The technique is simply to ask farmers about their experience with the new practice.

The aim of the research worker in a post-relase survey is described by Graham as:

> "The research worker aims to find a well proven management system incorporating the new technology and to evaluate this system in physical and financial terms. At the same time the research

---

11. Frampton, A., "The Economics of Growing Sugar Beet on Farms in South Otago", Unpublished M. Agr. Sc. Thesis, Massey University of Manawatu, 1964.

12. Williams, D.B., Parish, R., and Bollen, A.G., "Attitudes and Expectations of Wheat Growers in New South Wales", Review of Marketing and Agricultural Economics, 21, 1, 1953, p.7.

worker attempts to define exactly what are the preconditions necessary for success, and what associated management changes are necessary." 13/

Where the research worker is confident that the survey findings show the new practice under investigation to be profitable, the survey can be followed up by extension services. Where the validity of the survey findings is questionable, small farm experiments or subsidised farmer experimentation may be necessary before extension recommendations can be made.

Early adoption surveys have been made by Candler, 14/ Cartwright, 15/ and Graham. 16/

3.4.2,3 Non-adoption or behaviourist surveys.

In non-adoption surveys the survey worker is concerned to find out why some farmers refrain from adopting a new practice.

There are two possible sources of information for finding farmers reasons for non-adoption:

(i) Ask farming specialists such as extension officers, farm accountants, or bank managers;

(ii) Ask the farmers involved.

---

13. Graham, J.V., "The Economics of High Rates of Fertiliser on South Taranaki Dairy Farms", Unpublished M.Agr.Sc. Thesis, Massey University of Manawatu, 1964, p.11.

14. Candler, W.V., "A Study of the Economics of Bulk Handling of Wheat on Farms", Review of Marketing and Agricultural Economics, 27, 2, 1959, p.81.

15. Cartwright, R.W., "The Potential for Increased Production on Sheep Farms in Wairoa County", Unpublished M.Agr.Sc. Thesis, Massey University, 1967.

16. Graham, J.V., "The Economics of High Rates of Fertiliser on South Taranaki Dairy Farms", Op.cit.

Farm advisors and other specialists do not provide a very satisfactory source of information concerning the reasons for farmers non-adoption of new practices because they are generally not in very close contact with the non-progressive farmers.[17/] This means that the best source of empirical evidence on the reasons for non-adoption is interviews with the farmers concerned, i.e. a farm survey. Provided that the new practice has been proven to be profitable, net of tax, and congenial to the adopting farmers, the reasons for non-adoption fit into three main categories:

(i) Lack of information about the new technique or its profitability;

(ii) Some special restrictions which prevent adoption;

(iii) Satisfaction with the status quo.

Inevitably in these surveys farmers are being asked their reasons for "lack of progress". As farmers may not be willing to admit, even to themselves, the true reasons for this "lack of progress", non-adoption surveys call for very careful wording of questions, tact, rapport between research worker and farmer, and

---

17. In this survey it was found that the non-adopting farmers had little regular direct contact with extension officers (see Section 7.2.2,1). Accountants are normally not qualified to be able to adequately appreciate a farmers technical situation.

finally, an attempt to check the consistency of answers received.[18/]

No matter how skilled and careful the research worker, the result of non-adoption surveys are bound, to some extent, to be suspect. Nevertheless, in the absence of non-adoption surveys nothing would be known of farmers' reasons for non-adoption of new practices, and it would be extremely difficult to formulate any ideas as to how the rate of adoption of profitable new practices could be improved.

This thesis records the author's experience in conducting a non-adoption survey. Few, if any, other non-adoption surveys have been made in New Zealand except one by McMillion.[19/]

3.5 The Role of Farm Surveys in Research and Policy

3.5.1 Farm surveys and research

Farm surveys are a recognition of the immense fund of information that has been acquired by farmer experience and experimentation.

---

18. An example of the need for checking the consistency of answers received was seen on 1 farm where the author was told, at the beginning of the interview, that taxation was the major factor hindering increased production. Then throughout the interview the farmer mentioned various improvements he would make if he had time, and finally he said that if he had extra labour he would considerably increase production.

19. McMillion, M.B., "The Sources of Information and Factors which Influence Farmers in Adopting Recommended Practices in Two New Zealand Counties", Lincoln College Technical Publication, No.19, 1960.

Schapper has suggested that the role of surveys in economic research is to supplement data collected and published because of legal requirements, and to obtain data specifically related to research objectives; moreover he says:

> "interview surveys constitute a method of achieving an understanding of subjective economic phenomena and it is a prerequisite for their measurement." 20/

Schapper also said interview surveys "make possible the integration of psychological study of behaviour of individuals into the study of aggregate statistics." 21/

Candler, in discussing the role of farm surveys, states:

> "I personally believe that farm surveys should be much more widely used as an integral part of the national agricultural research effort than has been the case in the past. Farm surveys have three real advantages as a research technique - they are:-
>
> (i) Cheap - in that very significant results can be obtained for less than £2000,
>
> (ii) Quick, in that results can be obtained within eighteen months of inception of the project, and
>
> (iii) Flexible, in that a wide range of topics can be looked at without having to purchase specialised research equipment.
>
> It must, of course, be recognised that the results of a farm survey may be the recommendation that certain lines of technical agricultural research be pursued at the research stations. This should not be seen as

---

20. Schapper, H.P., "Uses and Limitations of Farm Surveys", Review of Marketing and Agricultural Economics, 25, 1-2, 1957, p.53.

21. Ibid. p.53.

> detracting from the survey technique. It should be recognised as a valuable contribution in helping orient the work of research stations toward farmers' real needs." 22/

3.5.2 Farm Surveys and policy

Schapper has stated the importance of farm surveys in policy decisions as follows:

> "In policy formation these surveys can show the proportion of the population favouring and opposing a particular policy, provide evidence on what policy is desired and needed, differentiate between those who favour one policy and not another, obtain data on levels of understandings of various sections of the public on particular issues, and so on. They can show legislators 'the real desires and wishes of the public, help to disarm special pressure groups, and show where there is a need for greater public information.' In serving all these functions, survey results should be used as guides to the deliberations and judgements of the legislator in much the same way as other factual data are used."23/

For a fuller description of the relation of farm management surveys to policy making see Scott.24/

---

22. Candler, W.V., "The Role of Farm Management Surveys", Op.cit., p.14.

23. Schapper, H.P., "Uses and Limitations of Farm Surveys", Op.cit., pp. 53-54.

24. Scott, J., "The Economic Implications of Re-Combined Milk for Town Milk Farmers in the Manawatu", Unpublished M.Agr.Sc. Thesis, Massey University, Forthcoming.

CHAPTER 4

FARM SURVEY OF THE RANGITAIKI PLAINS AND GALATEA

4.1 Summary

This chapter commences with a discussion of the objectives of this survey and continues with a description of farm selection, it concludes with a description of the survey method.

4.2 Objectives of the Survey

4.2.1 The situation prior to the survey

In 1963 Graham[1/] reported the findings of a survey in South Taranaki showing that dairy farmers could earn 20 per cent, after tax, on additional capital used to increase production. The basic pattern for increasing profit was more cows and more fertiliser. The technology for high dairy production had been known for some years, but prior to Graham's survey, there was little data available on profitability. In spite of this, progressive farmers in most dairy districts of the North Island of New Zealand had started implementing the technology required for high production.

---

1. Graham, J.V., and Candler, W.V., "Cows, Fertiliser, Production, Profit", Department of Agricultural Economics and Farm Management, Massey University College of Manawatu, 1963.

According to McMeekan [2] the importance of higher stocking rates for higher production was realised in the 1930's. No experimental work was done on this, however, until the mid 1940's.

McMeekan [3] pointed out in 1959 that the three basic factors affecting high production are:

(i) The amount of feed grown;

(ii) The proportion of the feed grown that is actually harvested by the animal;

(iii) The efficiency with which the animal uses the food consumed.

At farmers' conferences during the early 1960's, speakers such as Scott [4] and McMeekan [5] [6] placed a large emphasis on the importance of stocking rate and its effect on utilising the grass grown.

In stressing the full utilisation of pasture, emphasis was given to wintering systems and spring feeding patterns.

---

2. McMeekan, C.P., "The Pros and Cons of High Stocking Rate", Dairy-farming Annual, Massey Agricultural College, 1961, pp. 9-14.
3. McMeekan, C.P., "Factors Affecting the Efficiency of Conversion of Pastures to Butterfat", Proceedings Ruakura Farmers' Conference, 1959, pp. 167-176.
4. Scott, J.D.J., "What's Wrong with Your Production?", Proceedings Ruakura Farmers' Conference, 1960, pp. 127-140.
5. McMeekan, C.P., "The Pros and Cons of High Stocking Rate", Op.cit.
6. McMeekan, C.P., "The Pros and Cons of High Stocking Rate", Proceedings Ruakura Farmers' Conference, 1961, pp. 184-189.

Graham[7/] in 1963 related fertiliser level, stocking rates, and production.

In 1964 Carr[8/] related the adjusting of calving date to stock spring feeding in order to fully feed cows after calving and hence to increase production.

These ideas on high production spread amongst progressive farmers in the early 1960's. Leading farmers on the Rangitaiki Plains took interest in, and action on, these ideas.

This meant that during the early 1960's some farmers on the Rangitaiki Plains were making large increases in butterfat production. This increased production was being found to be both congenial, and profitable, to the farmer. Increases in production of the order of 20 to 30 per cent per year were not uncommon.

Table 4.1 shows the annual increases in production for the suppliers to the Rangitaiki Plains Dairy Company over the five years 1960/61 to 1964/65.

Officials of the Rangitaiki Plains Dairy Company and the local extension officers considered that an increase of 10 per cent per annum was a reasonable level to expect from farmers who were making use of modern technology.

---

7. Graham, J.V., "Report on a Taranaki Survey", Dairyfarming Annual, Massey University of Manawatu, 1964, pp. 34-40.
8. Carr, C.E.S., "Adjust Time of Calving", Dairyfarming Annual, Massey University of Manawatu, 1964, pp. 34-40.

Table 4.1 Rate of Production Increase[1] Over the Years 1960/61 to 1964/65 9/

Number of suppliers Total = 575	Annual percentage increase in butterfat production
39	More than 20.0
80	10.0 - 20.0
122	5.0 - 9.9
125	2.0 - 4.9
76	0.0 - 1.9
59	-2.0 - -0.1
74	Less than -2.0

[1]Amongst suppliers production more than 10,000 lb butterfat

---

9. The production figures used for calculating the regression equations were supplied by the factory. Subsequently the author found major transcription errors in the production figures supplied. These errors were found by checking the official statement of survey farmers from the dairy factory, with the figures supplied to the author. It is probable that there were errors in other unchecked cases (i.e. those not in the survey groups) and hence the percentage increase in production calculated for each farm and shown in Table 4.1 may not be accurate.

This error was the reason that Survey Farm Number 37 was selected in Survey Group B. The annual rate of increase in production on this farm was less than 2% per year on the figures used initially. When calculated on the correct production figures, the rate of increase in production was found to be 10.0% per year. This was not discovered until after the interview had been completed and hence the farm was included in the survey group.

The regression equations have been calculated again for the farms visited in the survey groups where major errors were found in the production figures. The figures reported for rate of increase in production in Tables 4.2 and 4.5 are all based on correct production figures.

It can be seen from Table 4.1 that 209 farmers (almost one third of the total suppliers[10/]) were increasing production at less than 2 per cent per annum.

The large number of suppliers who were not taking advantage of the potential for increased production caused concern amongst the directors of the Rangitaiki Plains Dairy Company and the local extension officers. They wanted to know the reasons for the slow progress on so many farms, and to find ways of eliminating the causes.

4.2.2 Finding the reasons for slow increases in farm production

There are a limited number of research techniques available to study the reasons for slow adoption of practices. The best method is to ask the people concerned. This involves a survey. The most satisfactory survey to obtain such information is one where the survey worker is able to probe behind the initial answers given by the farmers. This means that the only satisfactory research technique available to study the reasons for non-adoption is a free form non-adoption survey as outlined in Section 3.4.2,3.

By doing a non-adoption survey there was the possibility of raising the production on the relatively static farms by, say, 5 per cent per annum. This would apply to one-third of the suppliers

---

10. There were 645 suppliers in 1964/65 who had been operating over the previous four seasons according to the list supplied to the author by the Rangitaiki Plains Dairy Company at the commencement of this survey. Of these, 70 suppliers had an average production of less than 10,000 lb butterfat and were not included in Table 4.1.

to the Rangitaiki Plains Dairy Company. If this increase took place the increase in production from the 209 farms concerned would be 270,000 lb butterfat per annum.

The results of a non-adoption survey could also have a significant effect in exposing factors which are hindering the rate of progress on farms which are adopting modern technology.

4.2.3 The survey

This survey of the Rangitaiki Plains and Galatea was designed to:

(i) Evaluate the methods of development being used, and;

(ii) To find factors that are hindering increased butterfat production and how these might be overcome.

To achieve the first objective a group of 12 farms (Survey Group A) which had considerably increased production over the past five years were selected by the local extension officers.

These 12 farms were each visited by the author, and the farmers interviewed. From these interviews the methods used to increase production were obtained. The profitability of development was calculated for 5 farms.[11/] These calculations showed that on 4 farms the development was highly profitable to the farmer in the

---

11. The reasons for evaluating the profitability only on 5 farms are given in Section 6.6.

post-tax situation.[12] These farms were on different soil types, and development had commenced from different initial production levels. On the fifth farm where development had been slow, and expenditure had been mainly on capital items, the programme proved to be unprofitable to both the farmer and the nation, (i.e. before and after tax). The remaining farmers in Survey Group A all considered that the development they were doing was profitable and congenial.

To meet the second objective a random sample of 25 farms (Survey Group B) which had not increased production by more than 2 per cent per year over the past five years (1960/61 to 1964/65), was selected.

The farmers selected in the random sample were interviewed and each farm was studied on a whole farm basis. The author was able to get a complete overall view of the farms resources, and farmers management. The farmers financial situation was discussed, and where possible accounts were studied. In addition farmers were asked about their family situation and goals, and reasons for not increasing production.

Possible ways of overcoming the factors which were preventing farmers from increasing production, were discussed with farmers, and their reaction to various suggestions was noted.

---

12. See Tables 6.2 and 6.3 for profitability estimates.

4.3 Selection of the Survey Farms

The basic problem in the selection of farms for any survey is to use criteria such that the farms selected are those best able to supply the information required.

The farms in this survey were divided into two main groups, Survey Groups A and B. There was also a small "pre-survey" group.

Consideration had to be given to the size of these groups before selection could begin.

The purpose of Survey Group A was to establish the methods being used for development, and to test the hypothesis that increasing production was congenial and profitable to the farmer. This section was done as a background to the main part of the survey. Thus, Group A had to be as small as possible while still giving a reasonable coverage, on balance a sample of 12 farms was thought to be adequate.

Survey Group B was selected to study factors actually hindering increased production.

The extreme options available for this would be 'a large sample' or 'a small sample'. In 'a large sample' the results could only be reported in the form that "x per cent of the 250 farmers telephoned said that finance was hindering increased production."

In 'a small sample' where an intensive interview is possible, the results can be reported as "10 out of the 25 farmers interviewed said that finance was hindering increased production. However, of these 10 farmers 6 would not be able to go ahead because of a lack of technical knowledge, even if they had the finance." This involves an element of "subjective correction" by the research worker. It avoids the bald and completely misleading type of statement which is inclined to emerge from 'a large sample' survey, but involves the survey worker in judging how many of the farmers interviewed had inadequate technical knowledge.

To be successful this detailed reporting needs to be done by someone trained in agriculture after intensive interviews of a 'small sample' of farmers.[13/]

Survey Group B had to be as large as possible whilst still allowing for a very full interview. Graham interviewed 40 farmers.[14/] In the present study, taking account of the 12 farmers in Group A, and the wide range of topics to be discussed in the interview, it was felt that 25 farmers would be a maximum for Group B.

---

13. The importance of the 'small sample' is that the research worker should be able to visualise the farm and farmer to which each set of records refers, and to be able to recall much of the interview without the aid of his notes. This is necessary because at the time of the interview he cannot know the significance of the comments being made by the farmer.

14. Graham, J.V., "The Economics of High Rates of Fertilizer on South Taranaki Dairy Farms", Op.cit., pp.2-3.

4.3.1 Pre-Survey Group

Two farms were selected by the local extension officers in order to familiarise the author with the interview technique and the local farming conditions prior to commencing the survey proper. 15/ These 2 farms were selected because the farmers were progressive and well able to communicate their ideas.

4.3.2 Survey Group A

Survey Group A consisted of 12 farms selected on the following basis:

(i) A geographical distribution of farms over the various soil types on the Rangitaiki Plains and in Galatea.

(ii) A high level of production for their particular soil type. The rate of increase in production over the past five years

---

15. The local extension officers at the time of selection of this sample (November 1965) were:

Mr S. Hewitt, Farm Advisory Officer, Department of Agriculture, Whakatane.

Mr M. O'Connor, Advisory Officer, Whakatane Farm Improvement Club.

Mr J. Southcombe, Dairy Board Consulting Officer, Whakatane.

Mr D. Wright, Farm Advisory Officer, Department of Agriculture, Whakatane.

(1960/61 to 1964/65) was also considered. Farms with a production of less than a mean of 10,000 lb butterfat were not considered.

(iii) Farmers' ability to communicate. Farms were favoured where the farmer was known to be willing to be helpful, where he could describe clearly what he had done in developing the farm, and where he could explain current management.

(iv) Farm ownership. Farms were selected which had been owned by the present owner for at least five years.

A purposive selection by the local extension officers was necessary because of the restrictiveness of the above requirements.

Table 4.2 gives a listing of some of the most important production characteristics of the farms selected for Survey Group A. This table lists the farms in Group A in order of soil group. The total butterfat production for each farm in the 1964/65 season is given as well as the area of each farm (excluding run-offs). The butterfat production per acre in 1964/65 is shown and can be compared with the maximum butterfat production obtained within soil groups in the 1964/65 season on farms in this district. It can be seen that the highest producing farms in Group A were at the maximum level of production for their soil group in the 1964/65 season. The annual rate of increase in production over the last five years (1960/61 to 1964/65) is also shown for each farm. Although these farms were generally at a high level of production, only 5 farmers had increased production by an average of more than 10 per cent per annum.

Table 4.2

Some Characteristics of Farms Selected for Survey Group A

Soil Group	Survey Farm Number	Butterfat production 1964/65	Area acres	Production per acre 1964/65		Annual rate of increase over 5 years
				maximum production for soil group	Production on farm	
1-2	12	49958	350	240 - 320	143	15.8
2	11	35105	161	320	210	43.0
2	5	30258	105	320	288	22.2
2	6	35074	147	320	238	8.9
2	1	59012	186	320	317	2.1
3	2	48095	125	390	384	6.7
3	9	32042	81	390	390	24.7
3	10	52169	165	390	316	3.2
4	3	56774	122	480	465	3.4
4	4	105470	327	380	352	8.9
4	7	60410	151	480	400	3.4
4	8	66118	144	480	475	20.3

4.3.3 Survey Group B

Survey Group B consisted of 25 farms selected at random from farms averaging more than 10,000 lb butterfat, and with a production tending to increase at less than 2 per cent per annum over the seasons 1960/61 to 1964/65. Farms already at a "high" level of production[16/] were excluded, as were farms which had changed ownership in the last five years.[17/]

At the commencement of the survey the survey worker had no clear hypothesis as to what were the factors hindering increased butterfat production. This meant that farms could not be selected on more purposive criteria than those outlined above. The best that could be done was to meet an average group of the farmers who complied with the above qualifications, which, in turn, meant a random sample.

---

16. A high level of production was arbitrarily defined by the author for each soil group. The level taken was 70% of the maximum production obtained on the particular soil group in the 1964/65 season. The maximum per acre production obtained on each soil group in the 1964/65 season is recorded in Table 4.2.

17. These criteria were checked as carefully as possible when the farms were initially selected. In 5 cases, however, an error was made in the change of ownership of the land over the past five years. In 2 cases, this transaction was from father to son and the management pattern remained the same. In the other 3 cases, the farms had been purchased from outside farmers three or four years previously and the present farmer knew relatively little about the previous owner's management practices. This error was not discovered in these cases until the interview was in progress and, accordingly, the farms were included in the survey sample.

Regression equations of production over time were calculated for all suppliers to the Rangitaiki Plains Dairy Company to determine production trends.

The selection of the random sample was done by listing in order, all the farms with a mean production of more than 10,000 lbs butterfat over the last five years (1960/61 to 1964/65) and whose rate of increase in production was less than 2 per cent per annum over this period. A sample of 25 farms was then selected from these 209 farms by arbitarily picking the first farm and then taking every eighth farm after this.

The areas of the farms initially selected for Survey Group B were obtained from the Whakatane County Council. The butterfat production per acre was then calculated, so that farms at a high level of production could be rejected. The production per acre was only calculated for farms initially selected in the survey sample because of the difficulty involved in obtaining the areas of a large number of farms.

To replace farms which were rejected from the survey group (i.e. those having too high a production level, or a recent change of ownership), the farm immediately above and then the one immediately below in the listing of rate of increase in production, were taken.

Out of the first 25 farms selected, 14 were acceptable on production level. In 2 of these cases the farmer was unwilling to co-operate.

Table 4.3 shows the significance of the rejection criteria for farms initially selected for Survey Group B.

Table 4.3 Rejection Criteria for Farms Initially Selected for Survey Group B

Criteria	Number of farms
Farm ownership changed over the last five years	3
Farms already at a high level of production	8
Farmers unwilling to co-operate	2

Table 4.4 shows the significance of the rejection criteria for all the farms selected for Survey Group B. A total of 49 farms were selected before a sample of 25 was obtained to suit the agreed criteria.

Table 4.4 Rejection Criteria for all Farms Selected for Survey Group B

Criteria	Number of farms
Farm ownership changed over the last five years	10
Farms already at a high level of production	12
Farmers unwilling to co-operate	2

One third of the total suppliers to the Rangitaiki Plains Dairy Company were eligible for Survey Group B on the basis of the rate of increase in production. However, half of the farms selected for

Group B were unsuitable on the basis of the other criteria.[18] Thus, it can be seen that the results of this survey are likely to be directly applicable to one-sixth of the suppliers to the Rangitaiki Plains Dairy Company.[19]

Table 4.5 shows some of the main characteristics of the farms finally selected for Survey Group B. The farms are ranked in order of soil group. The total production and area of each farm is shown. The maximum production in the 1964/65 season on each soil group is shown, as well as the level of 70 per cent of the maximum above which farms were classified as being at a high level of production. From Table 4.5 it can be seen that the per acre production on many farms in Group B was considerably below 70 per cent of the maximum production obtained within each soil group. Fourteen out of the 25 farms in Group B were actually decreasing production over the five years 1960/61 to 1964/65.

---

18. It is of interest to note that 20% of the static farms initially selected had been sold in the past five years. This may suggest a trend for static farmers to get off their properties, thus opening the way for new owners to develop them.

19. Although the results are only directly applicable to one-sixth of the suppliers to the Rangitaiki Plains Dairy Company it can be argued that they will be actually applicable to most farmers increasing production at less than 5% per annum (over half the suppliers) and will have a significant effect on many farmers increasing production at a more rapid rate.

Table 4.5

Some Characteristics of
Farms Selected for Survey Group B

Soil Group	Survey Farm Number	Butterfat production 1964/65	Area acres	Production lb butterfat per acre 1964/65: maximum production for soil group	70% of top production	production on farm	Annual rate of increase over 5 years
1	20	21215	140	240	167	152	-1.5
1	21	22301	142	240	167	157	1.8
1	22	18597	175	240	167	106	1.3
1	25	11730	135	240	167	87	-7.9
1	36	18048	150	240	167	120	0.5
1	37	20341	195	240	167	104	10.0
2	18	33720	150	320	224	224	0.9
2	19	28349	156	320	224	182	0.2
2	24	18252	120	320	224	152	1.2
2	30	11480	116	320	224	99	-6.3
2	31	18601	141	320	224	132	-1.9
2	35	17489	190	320	224	92	-2.1
3	13	21126	80	390	272	264	1.7
3	16	18273	70	390	272	261	-0.8
3	27	21194	110	390	272	193	-3.2
3	32	35507	167	390	272	212	0.4
3	34	34799	209	390	272	166	0.0
4	14	23515	85	480	340	276	-3.9
4	15	19897	94	480	340	212	-0.1
4	17	19677	88	480	340	224	1.5
4	23	28376	155	480	340	183	-0.5
4	26	27167	97	480	340	280	-1.1
4	28	29047	112	480	340	260	-0.2
4	29	39671	221	480	340	180	-5.3
4	33	51100	200	480	340	256	-4.2

4.4 Survey Method

4.4.1 Questionnaire

Prior to commencing the survey the author prepared a check list to see that every major topic was covered before completing each interview. This list of topics was also helpful to him if there was a pause in the farmer's description of the farm and farming operations.

No fixed questionnaire was used as any set pattern would tend to overlook many intangible, and unforseen factors, which may be brought out by permitting the farmer to talk freely about the farm and the problems associated with it.

This free form type of interview meant that the survey worker had to write up the visit each night.

The check list used by the author is given in Appendix A.

4.4.2 Establishing contact

The method of initial contact with the farmer varied between the survey groups.

The initial contact with farmers in the Pre-survey sample and Survey Group A was made by telephone. At this time a suitable day was arranged for the farm visit. Most of the farmers in these groups knew all about the project, as they were men who generally kept well up-to-date with local events. The telephone contact was made by one of the senior men at the dairy factory - generally the transport manager. This meant that the farmer was well aware of the link between the survey and his dairy factory.

In Survey Group A the author's first contact with the farmer was when he arrived at the farm.

The farmers in Survey Group B were initially contacted by a letter which explained the purpose of the survey and that it was being done for the Rangitaiki Plains Dairy Company. The author telephoned the farmers shortly after the letter was sent. Provided the farmer was willing to co-operate, a date was then arranged for the farm visit.

Wright[20/] found it was much better to approach the farmer first by letter as this gave him time to think about the survey and not be taken unawares when telephoned. The immediate reaction of some farmers to giving up a full day and supplying all the information about their farms would be negative. However, after thinking about the idea, their replies were generally in the affirmative. Indeed only 2 farmers refused to co-operate in the survey. Undoubtedly the sponsorship of the survey by the Dairy Company was an encouragement to farmers to co-operate.

4.4.3 Interview technique

Interview technique varied considerably, but on all except 3 farms, an inspection of the property was the first step. This enabled the survey worker to gain a clear picture of the farm. The

---

20. Wright, A., "The Development of Unploughable Hill Country", Unpublished M. Agr. Sc. Thesis, Massey University of Manawatu, 1963, p.21.

management practices could then be discussed and related to the farm situation. In the other 3 cases the farmer was more interested in records (stock and production figures) or financial information, and as he produced these to begin with they were dealt with first.

Having no fixed questionnaire meant that the interview could be very flexible and organised so as to suit the personality of the individual farmer concerned. Before leaving the farm the author consulted his check list to see that all major topics had been covered.

Various farming practices were discussed during the farm walk, and outline notes were taken. As this survey also involved collecting information on farmer's personal affairs and goals note-taking was curtailed on these items, until after the interview, if it became apparent that the farmer appeared self conscious and was cutting his responses short because of this. Wilkening also found that this was the best method of conducting a free form type interview.[21]

Stock numbers, manure application rates, production and financial information were inspected and recorded at the house.

The walk around the farm and discussion of practices during it, generally lasted all morning. Most of the afternoon was spent

---

21. Wilkening, E.A., "A Sociopsychological Approach to the Study of the Acceptance of Innovations in Farming", Rural Sociology, 15, 4, 1950, p.352.

in talking about the farm and future possible development. Interviews began at 9 a.m. in the summer-autumn period, but in winter they did not commence until 10 a.m.. The later winter start was because at that stage the author was mainly visiting one-man farms, where the farmer required time for feeding out before the interview began.

The hospitality extended by farmers to the author was very much appreciated, both from the viewpoint of assistance in the survey and socially. Talking about farming in the district in a relaxed atmosphere helped to give the survey worker a good picture of local farming and its development, as well as providing a number of insights into the farmer's attitude to district management practices.

The farmers' confidence seemed to be considerably increased when the fact was emphasised that in this survey the author was concerned with getting a full picture of each 'whole farm', rather than a few figures, such as production per acre, to compare with neighbouring farms (some of which had run-offs).

The establishment of farmers' confidence was very important for obtaining satisfactory information. This emphasises the fact that the survey worker must be tactful, and a trained agriculturist familiar with the type of farming concerned, so that an intelligent practical conversation can be held.

The survey worker must also understand the purpose of the survey, and feel it is sensible and worthwhile, so that this conviction can be transferred to the farmers.

Some of the farmers who were not developing were naturally rather sensitive to the suggestion that they might be able to produce more butterfat with few extra resources. It was necessary to be aware of this and not to push too hard, but rather to try and get information concerning their reasons for lack of progress from other angles.

Some farmers were very open and receptive to ideas as to how they might increase production. This type of farmer was much easier to approach, and provided a most stimulating interview.

Graham has summarised the advantages of the 'free form' type interview as used in this survey, as follows:

> "(i) Information obtained in previous interviews can be incorporated into the discussion. New aspects of the original hypothesis can be considered.
>
> (ii) A free flow form of interview allows questions to be asked which relate directly to individual farms and farmers. Development methods for a wet soil farm are likely to be greatly different from those used on a farm situated on drier soils.
>
> (iii) Greater rapport can be established between interviewer and farmer."22/

4.4.4 Contact with the farmer after the interview

The author has had contact with most farmers since the farm inspection in order to collect extra information.

---

22. Graham, J.V., "The Economics of High Rates of Fertilizer on South Taranaki Dairy Farms", Op.cit., p.46.

In July 1966 a letter was sent to 18 farmers in Survey Group B asking if they would be willing to allow the Farm Dairy Instructor to inspect their milking plant and provide the author with a report on the machines. This letter was only sent to 18 out of the 25 farmers in Group B because the author had only visited 18 farms at that stage. The testing of the milking machines had to be done in winter because it was the only time the Dairy Instructors were available for the work. With this letter a detachable return form was added for the farmer to return to the author if he did not want his machines tested. No farmers returned the circular.

In February 1967 a letter was sent to 2 farmers in Group A and 8 farmers in Group B asking for permission to visit their accountants and inspect their accounts. This was done in order to obtain financial information for the 1964/65 season which had not been available on the farms at the time of the farm inspection because either the accountant had not finished them, or else they had been mislaid by the farmer. This permission should have been obtained at the time of the farm interview but was overlooked by the author. Of the ten letters sent out seven were returned.

In May 1967 the author made a telephone survey of half the farms in Survey Groups A and B. Only a random half of the farmers in both groups were approached because of the time involved. In this telephone survey the author sought to find out the farmers' use of non-direct extension services, and their fertiliser usage in the 1966/67 season. During the farm interview the author had gathered full information on the farmers use of individual direct contact extension services, but had failed to obtain full details on the farmers use, and attitudes towards, mass and group extension media. This information was important for recommending the type of extra services required in the district. The telephone survey questionnaire is given in Appendix A.

The method of conducting the telephone survey was very flexible, and was held in a friendly, personal, conversational manner because of the author's previous contact, and friendship established with the farmers. All farmers responded well to these additional questions, and were very willing to co-operate again.

The author also had extra direct personal contact with 4 farmers in each of the survey groups.

In accordance with the philosophy of "small sample" surveys, emphasis was placed primarily on the intensiveness of the interviews completed, rather than on the number of farms contacted.

CHAPTER 5

THE SURVEY FARMS

5.1 Summary

This chapter discusses the survey farms. It is divided into three main sections. The first section discusses the resource inputs, land, pastures, drainage, irrigation, subdivision, buildings, water supply, fertilizer application and labour on the survey farms.

The second section discusses the stock, production and management. Information is given on stock and production levels, animal health, calving dates, calf rearing and pasture management.

The third section briefly discusses the authors impressions of the four main farming systems used on the survey farms.

5.2 Resources on the Survey Farms

5.2.1 Land

In this survey soils with slight textual differences have been grouped together into four soil groups based on production potential.[1]

The survey farms are evenly distributed over the four soil groups.

On all except 2 farms, both of which are in Survey Group B, the land is approximately flat. Farms 27 and 30 are hilly.

---

1. See Section 2.4.

Table 5.1 gives the size distribution of the survey farms and shows the soil groups to which they belong and the number of farms with run-offs.

Table 5.1 Distribution of Farm Size

Size range acres	Number farms in Soil Group 1	2	3	4	Total number farms in size range	Number of farms with run-offs
Survey Group A						
70 - 100	Nil	Nil	1	Nil	1	1
101 - 150	Nil	2	1	2	5	4
151 - 200	Nil	2	1	1	4	2
201 - 350	1	Nil	Nil	1	2	1
Survey Group B						
70 - 100	Nil	Nil	2	4	6	2
101 - 150	3	4	1	1	9	3
151 - 200	3	2	1	2	8	3
201 - 350	Nil	Nil	1	1	2	Nil

The average farm size is 172 acres in Survey Group A and 142 acres in Group B.

5.2.2 Pasture

The pasture composition varied widely. Some pastures are clover dominant,[2/] some paspalum dominant,[3/] some contain mainly poor

---

2. A clover dominant pasture has been assumed to be one containing more than 60% clover in early summer.

3. "A paspalum dominant sward is assumed to be one where this grass is dominant only in summer and autumn." Definition given by Hewitt, S.R., and Pullar, W.A., "Pasture Problems on Tarawera Ash on Rangitaiki Plains", New Zealand Journal of Agriculture, June 1962.

species such as browntop, yarrow and sweet vernal, while others are mainly ryegrass and white clover with some praire grass.

The pasture composition reflected the stocking rate and grazing management. On highly stocked farms pastures are generally good containing mainly ryegrass-white clover swards, with some praire grass and paspalum.

The pastures on lightly stocked farms on the heavier soils generally contain a lot of paspalum,[4/] whereas those on the drier soils contain a lot of yarrow and browntop.

Table 5.2 gives a distribution of the predominant type of pasture on the survey farms.

4, Farmers experience in controlling paspalum varied, however the following patterns emerged:

(i) Where paspalum is dominant, but not root bound (paspalum pre-dominant all the year round) pastures can be changed to a desirable balance of species by heavy stocking (say 1.2 cows per acre), and high fertilizer rates (say 7 cwt per acre). If full utilization is made of the feed grown, as it is grown, then paspalum will grow in summer and be well grazed during that time. With high fertility, ryegrass will grow in the autumn and spring and will not be shaded or choked out of the pasture.

(ii) Where pastures are paspalum root bound ploughing and rye-grassing are needed. In the new pastures paspalum can be contr-olled by heavy manuring and heavy stocking.

(iii) On lightly stocked farms farmers said that the only way to control paspalum is to replough every 15 years and to sow an intermediate crop of turnips or Italian ryegrass.

Table 5.2 Distribution of Predominant Type of Pasture

Main type of pasture	Number of farms	
	Group A	Group B
Clover dominant	1	Nil
Paspalum dominant	1	7
Ryegrass-clover with strong paspalum	5	8
Ryegrass - white clover	4	6
Browntop - sweet vernal	1	4

Lucerne, which is grown on all the survey farms in Galatea and on 2 farms near Onepu, is an important crop for supplementary winter feed and summer grazing.

Table 5.3 shows the distribution of lucerne on the survey farms.

Table 5.3 Distribution of Lucerne

Percentage of farm in lucerne	Number of farms	
	Group A	Group B
1 - 9	Nil	1
10 - 19	2	3
20 - 29	Nil	4
30 - 39	Nil	1

In each case the lucerne is heavily infested with grass.[5/]

Farmers expressed considerable ignorance as to the value of lucerne, the method of establishment, the best method for its usage, and the area which can most profitably be used per farm.[6/]

On 6 farms in Survey Group A, and 16 farms in Group B most of the pastures are at least six years old and some are up to thirty years of age. The old pastures on the high producing units are generally in good condition.

Table 5.4 gives an outline of the main reasons survey farmers gave for having large areas of new pastures.

The farmer growing a summer crop primarily for extra feed had an abundance of pasture when visited by the author in February 1966. The author considers that it would be better to insure against drought by carrying more silage, than having a crop which must be used. There is a danger that feeding a summer crop will lead to undergrazing of pasture with consequent paspalum dominance.

---

5. Moody, R.W., Farm Advisory Officer, Department of Agriculture Rotorua, Pers.comm., recommends that lucerne be sown alone, but that Italian ryegrass, Western Wolth ryegrass or Cocksfoot may be introduced at a later date.

6. Ibid. The following are recommendations for growing lucerne in Galatea.
   Establishment:- Two or three weeks before sowing apply 4-5 cwt per acre of 15% or 30% potassic superphosphate along with 20 lb borax. Drill innoculated seed into a well prepared seed bed in October, with 3-4 cwt per acre of lime. Preferably sow the lucerne alone, grasses may be introduced later. It is recommended that 10-40% of the area of Galatea farms be in lucerne, the actual area depending on the soil type.
   Maintenance:- Apply 6 cwt per acre of 30% potassic superphosphate and 20 lb borax in two lots, late winter/early spring and following the first or second cut. Lucerne should not be grazed during frosty weather as the treading effect will destroy the majority of the lucerne plants.

Table 5.4 Reasons for Farmers Having Large Areas of New Pastures

Reason	Number of farms	
	Group A	Group B
Cropping primarily for pasture renovation and also to provide extra feed.	2	3
Cropping primarily to provide extra summer feed	1	Nil
Pasture renovation with an intermediate crop of Italian ryegrass.	2	3
New pastures sown because of flood damage	1	3

On 1 farm in Survey Group B where regrassing is a regular procedure the farmer is unable to get a balanced ryegrass-white clover pasture. The reason for this was obvious upon inspection of the farm. New grass paddocks sown in early autumn are not grazed until spring. This means that there is long rank ryegrass which smothers the clover. In the second year the ryegrass production is very poor because of the low nitrogen content of the soil. The clover then grows vigorously and becomes dominant. This problem needs an extension officer to visit the farm and point out to the farmer the need for earlier grazing of new pastures.

The key to the maintenance of a good pasture appears to be adequate grazing pressure [7/] to ensure that most of the grass grown is eaten as it grows, together with an application of potassic superphosphate at the rate of about 6 cwt per acre.

5.2.3 Drainage

Drainage is very important on farms on the Rangitaiki Plains, particularly on the better soils as these tend to be wet, however care has to be taken to prevent overdraining on peat soils.

High producing farms are intensively drained with open drains, and 1 farmer in each of Survey Groups A and B is using mole drains as well. Mole drains last approximately two years, but drain away a lot of water during that time.

---

7. An example of the need for adequate grazing pressure was seen by the author on Survey Farm Number 8 where, for 20 years, night grazing was on approximately a quarter of the farm all the year round. There would have been a fertility transfer to this area of the farm although this has been partly compensated for by applying an extra 1 cwt. fertilizer per acre on the rest of the farm each year.

   Day grazing for the first 15 years was approximately 0.5 cow per acre. Night grazing during this time was approximately 1.5 cows per acre. Grazing in 1966 was approximately 1 cow per acre during the day and approximately 2 cows per acre at night.

   Thus it can be seen that the night grazing has always been more intensive than the day grazing. The author was interested to note the difference in pasture composition between the day and night paddocks. The night paddocks had no paspalum, only ryegrass and white clover plus a few weeds - pasture was short in January. The day paddocks had long rank pasture and were dominant in paspalum, although ryegrass and white clover were present.

On 1 farm faceen drains [8] have been successfully used, however, the farmer now considers the expense of installing these is too high.

There are 2 farms in Group A and 4 in Group B that have to have surplus ground water removed by pumps. The other farms are at sufficient altitude for drainage to be done by gravity.

In Galatea open drains are needed to carry away surface water, as well as seepage water which runs underground from the hills and surfaces in many places in the basin.

Table 5.5 shows the type and adequacy of drainage on the survey farms.

Table 5.5 Drainage on the Survey Farms

Method of drainage	Number of farms	
	Group A	Group B
Adequate open drains with ground water pumps	2	4
Adequate open drains	6	3
Adequate open drains plus mole drains	1	1
Insufficient open drains for progress	Nil	8
Light soil and drainage not currently critical.	3	9

8. Faceen drains are formed by digging trenches (about 10in. wide and 20in. deep) across the paddocks entering into open drains. They are then filled with about 12in. of manuka or similar porus filling and the soil is replaced.

The necessity for, and value of, drainage is only recognized as the stocking rate increases and the problems (pugging and pasture damage) caused by lack of drainage are accentuated.

5.2.4 Irrigation

Two farmers in Survey Group A use spray irrigation. One farmer obtains water by pumping from a main drain, and the other from a stream. On these farms irrigation is generally only practised for two or three weeks in a year, and even this is not required every year. Although it is an insurance against drought it is not used much. It is difficult to know when to irrigate as successful irrigation must commence before the ground dries out too much. This means setting up the irrigating equipment after a short dry spell even when the probability of rain is substantial. Neither of the irrigating farmers is enthusiastic about it.

5.2.5 Subdivision

Table 5.6 gives the daily grazing pressure on the survey farms.

Table 5.6 Grazing Pressure on the Survey Farms 1965/66

Grazing pressure cows/acre	Number of farms	
	Group A	Group B
6 - 40	2	25
50 - 100	10	Nil

The length of grazing is normally 12 hours, although on the 2 farms in Survey Group A with a light grazing pressure, 24 hour grazing is used. These 2 farms were purchased during the last five years and available cash has been spent on stock and fertilizer, rather than on fencing.

The lower grazing pressure on the farms in Group B is indicative of the lower stocking rate, and the lower rate of utilization of pasture.

Fence quality varied from poor to good, and from semi-permanent electric fences to 5-wire permanent fences.

5.2.6 Buildings

There are many new buildings on the farms in Survey Group A. This is a result of the large capital expenditure that has been made as part of many development programmes. New houses for workers have been built on a third of the farms in Group A in the last five years.

Ten farms in Group A have Herringbone cowsheds. Two of these were built during the winter of 1966. The farmers without Herringbone cowsheds recognize their necessity and hope to build soon.

The buildings on farms in Group B are generally older and in poorer condition than those on farms in Group A. On Group B farms there were 7 Herringbone cowsheds and 18 conventional walk-through or internal race sheds. In 9 cases cowsheds will have to be renewed within the next five years. Seven of the farmers with old conventional sheds are giving serious consideration to changing to a Herringbone shed, mainly because of labour shortage.

5.2.7 Water supply

The reticulation of water around the farms is assuming much importance on the larger units where cows are being concentrated in small areas each day. On the large farms (400 cows) a main water line of 1.25 inches diameter has been found necessary.

Except for 2 farms in Survey Group A, and 4 farms in Group B there are water troughs in each paddock. At the time of the farm inspection the 6 farmers who did not have water reticulated to each paddock said they intended to complete the reticulation scheme as soon as finance becomes available.

5.2.8 Fertilizer

The rates of application of fertilizer have generally increased over recent years on the farms in Survey Group A, and split dressings, spring and autumn, have become more popular. The normal fertilizer used is 30 per cent potassic superphosphate applied at an annual rate of about 6 cwt per acre.

When farmers in Group A use trace elements (mainly copper and cobalt) they are generally applied with discretion under the direction of an extension officer. One farmer in this group, however, was using trace elements because he thought "it might be a good idea". His evidence for thinking this was vague.

In general the farms in Group B receive lower rates of fertilizer than those in Group A, and more generally, only receive it in one application per year. This lower manure rate is right because the stocking rates are lower. Higher levels of fertilizer are not likely to be needed until the stocking rates are increased.

Some farmers in Group B haphazardly use trace elements. They hear of a trace element giving a response somewhere and so try it for a year. Copper, cobalt, and magnesium (as serpentine superphosphate) are most commonly used. Other farmers continue to use the traditional fertilizer, straight superphosphate.

The Group B farmers in Galatea generally apply a single dressing of fertilizer in spring. This is an old idea which developed because it was said that nothing would ever grow in Galatea in winter, thus there was no value in autumn topdressing. The Group A farmers in Galatea however, are finding that split dressings in autumn and spring are desirable and provided there is ryegrass in the pasture, winter growth is maintained.

The fertilizer treatment of lucerne is poor and shows a lack of understanding of the needs of this plant. Some farmers use lime, some dolomite, some boron, some potassic superphosphate, and some straight superphosphate. Knowledge is generally lacking as to what is the best treatment.[9]

---

9. Recommendations have been given in footnote 6 of Section 5.2.2 for fertilizer treatment of lucerne in Galatea.

Details of fertilizer rates, and times and methods of application on the survey farms are given in Appendix B.

The overall impression gained by the author from farmers in Group B is that they have little real understanding of the correct use and value of fertilizer. Consequently, they are unable to make sound decisions as to how much to apply, when to apply it, and what type of fertilizer to use.

Nitrogen has been used on 1 farm in Group A where it considerably boosted the early spring growth. Even though later calving is becoming more common it would seem advantageous for farmers to consider applying 1 or 2 cwt per acre of nitrogen over a small area of their farms, if the early spring feed situation becomes critical.

Prior to the 1965/66 season, only 3 farmers in Group A used bulk topdressing services, but in the 1966/67 season 5 farmers used this service.[10/]

Budgeted costs show that it is economical to use bulk topdressing, even though many farmers are hesitant to do so.[11/] The reasons for this hesitancy are generally:

(i) Farmers have not budgeted the alternatives and are unaware of the saving involved, and

(ii) Farmers are unaware of the quality of the service available.

---

10. The lack of use of bulk topdressing prior to January 1966 was understandable because of the poor service available. In 1966 two new firms were providing a reasonable bulk topdressing service on the Rangitaiki Plains.

11. See Appendix C for a cost comparison of applying bagged and bulk manure.

Many of the farms in Group B are one man units, and have used bulk topdressing to save labour. Most of these farmers are satisfied with the service.

5.2.9 Labour

All the farms in Survey Group A are more than one man units. Three of the farmers rely on family labour, the others hire non-family labour.

Six of the farms in Group B are one man units, 8 farmers employ permanent non-family labour, and the remaining 11 farmers utilize family labour.

Table 5.7 shows the labour input on the survey farms in the 1965/66 season.[12/]

In 1965/66 the average total labour input was 2.6 units on farms in Group A and 1.5 units on farms in Group B, while the average labour input per 100 cows was 1.49 on farms in Group A and 1.74 on farms in Group B.

---

12. In evaluating the labour input the following assumptions have been made:

    Man over 18 years = 1 unit

    Boy under 18 years = 0.75 unit

    Owner managing the property but doing little physical work = 0.5 unit

    Wife assisting with all milkings = 0.5 unit

    No allowance has been made for contractors.

Table 5.7 Labour Input on the Survey Farms

Labour units per 100 cows	Number of farms	
	Group A	Group B
1.00 - 1.40	4	6
1.41 - 1.80	8	9
1.81 - 2.00	Nil	4
2.01 - 3.00[a]	Nil	6

[a] The farmer with 3.0 labour units per 100 cows did an "artificial inseminating run" in the spring, and contract hay-baling and carting over the summer.

The farmers in Group B, although they have a heavier labour input, tend to use contractors more than the farmers in Group A.[13]

Amongst the leading farmers share-farming is losing popularity because of the innate tendency towards inefficiency.[14]

The farm owners feel they are giving too much away to a sharemilker who spends little, and gains a lot of the benefit from the owners money spent on developing the farm, increasing the herd size, and introducing improvements which make the work easier. This increasing dissatisfaction amongst farm owners concerning sharemilking

---

13. Contractors are used for haybaling and carting, silage making, hedgecutting, fencing and drain cleaning. Contractors provide equipment where the capital overhead is too high for a small farmer.

14. Sargent, E.D., "Some Problems Arising from Present Sharefarming Agreements", Dairyfarming Annual, Massey University of Manawatu, 1965, pp 32-40.

agreements has caused 'farm managers' to arise as a new class of farm workers. In Group A 1 farm was run by a sharemilker, and 1 farm by a manager, the remainder were owner operated.

In Group B 5 farms were run by sharemilkers. Two of these sharefarming agreements were family situations with 29 and 50 per cent sharemilkers respectively. The other 3 were non-family situations, 2 of which were run on a 50 per cent agreement and 1 on a 39 per cent agreement.

5.3 Production and Management on the Survey Farms

5.3.1 Production

The farms in Survey Group A increased production at rates varying from 3.2 to 43.0 per cent per year over the five years 1960/61 to 1964/65. The rate of increase in production on the farms in Group B over the same time period varied from 10.0[15/] to -7.9 per cent. Fourteen out of the 25 farms in Group B were actually decreasing production.

Detailed figures for stock and production on the survey farms for the 1964/65 and 1965/66 seasons are given in Appendix B.

---

15. This farm was included in Group B because of a clerical error in the production figures on which the farm was selected. See Section 4.2.1. Farms in Group B were selected as those increasing production by less than 2% per annum.

5.3.2 Government valuation and production

Table 5.8 gives a summary of the government valuation per lb butterfat, and per cow on the survey farms in 1964/65. It can be seen from Table 5.8 that the farms in Group A had a much lower level of capital investment per unit of production than the district average, but that the farms in Group B were similar to the district average.

Table 5.8 Government Valuation and Production 1964/65

Item	Survey Group A $	Survey Group B $	Average for Bay of Plenty[16] $
Range government valuation per lb butterfat	0.46-0.80	0.47-1.43	N.A.
Average government valuation per lb butterfat.	0.66	0.99	1.01
Range government valuation per cow	160-294	146-384	N.A.
Average government valuation per cow	228	270	276

'N.A.' indicates 'not available'

16. "A survey of the economic structure of factory supply dairy farms in New Zealand in 1963/64", New Zealand Dairy Board, Wellington, 1966, p.28.

5.3.3 Dairy stock

In Survey Group A there are 4 straight Jersey herds, 7 herds containing a lot of crossbreds (mainly Jersey-Friesian cross), and 1 herd consisting of half stud Jerseys and half stud Friesians.

On the farms in Group B there is 1 grade Friesian herd, 1 grade Ayrshire herd, 2 stud Jersey herds and 12 grade Jersey herds. The remaining 9 herds consist mainly of Jersey-Friesian crossbreds.

The reasons farmers gave for their interest in maintaining Jersey-Friesian crossbred herds were:

(i) They produce a hardier calf which is easier to rear. This is partly because of hybrid vigour.

(ii) The milking cow is hardier and can be pushed onto harder feed than a Jersey.

(iii) The bobby calf is heavier, although there is no record of any increase in calving trouble. This was important on 1 farm where consideration was being given to rearing Friesian cross steers for beef. This would have little application on most farms but where labour is limited and there is still surplus feed, particularly at an intermediate stage of development, this practice may be profitable.

(iv) The crossbreds tend to increase the effective stocking rate.[17/] Crossbreds produce more butterfat per cow and thus if they

---

17. Campbell gives the following stock conversion factor:
11 Jerseys = 9 Friesians
thus 11 Jerseys = 10 Crossbreds.
Campbell, I.L., "Are We Using the Right Breed?", Dairyfarming Annual, Massey University, 1966, p.13.

are stocked at the same rate as Jerseys the butterfat per acre increases.

Eleven farmers in Group A have been using artificial breeding for many years, and the twelfth farmer started using it in 1966.

Sixteen farmers in Group B have been regularly using artificial breeding for mating most of their herd for many years.

Two of the farmers in Group B who do not use artificial breeding own stud herds and hold strong views against this practice. The other reasons farmers gave for not using artificial breeding were:

(i) That it is too expensive. This is correct in so far as the cost for inseminating a herd is higher than using cheap bulls. In the authors opinion, however, the long term advantage in herd improvement, far outweighs the small extra cost for artificial breeding.

(ii) Low conception rate. This is correct if the farmer is unable to identify cows in season, but if the farmer is able to do this (as most farmers can) the average conception rate for artificial breeding and natural mating is very little different.[18/]

---

18. On a farm record survey natural mating gave a non-return rate of 66% to first mating, and artificial breeding gave a 64% non-return rate average for New Zealand in 1961. In 1962 and 1963 the artificial breeding conception rate was 66% and in 1964 it was 68% for the national average and 71% in the Bay of Plenty. "Farm Production Report and Summary of Board's Work 1964/65 Season", New Zealand Dairy Production and Marketing Board, Wellington, 1966, No.41.

5.3.4 Pigs

At the time of the farm visits 1 farmer in Survey Group A had pigs. These were sold in mid 1966 and the farm changed to whole milk supply.

At the time of the authors visit, 5 of the farms in Group B were on cream supply and reared pigs. At this time 3 of these farmers said that they were changing to whole milk supply and going out of pigs in mid 1966. In May 1966 the remaining 2 farmers felt they could not afford the expense of changing over to whole milk supply and intended to continue rearing pigs.[19/]

5.3.5 Calving dates

Over the last few years there has been a marked swing towards later calving on the farms in Survey Group A. Instead of calving in early July farmers are now tending to calve between late July and mid August. This trend has been introduced so as to be able to fully feed cows, from calving onwards, with good quality pasture, and to minimize the required amount of conserved feed.

Farmers in Group B generally calve their cows in early July. Six farmers have commenced to follow the trend to later calving established in Group A and other farmers are becoming aware of the change; but as yet have not altered their calving date.

---

19. One of these farmers subsequently changed to whole milk supply for the 1966/67 season.

In the author's opinion, which is based on the knowledge gained from farmers in Group A, later calving would be a desirable feature on most of the farms in Group B.[20/]

Table 5.9 gives the distribution of calving dates on the survey farms in 1966.

Table 5.9 Calving Dates 1966

Date	Number of farms	
	Group A	Group B (a)
Before 30 June	Nil	1
1 - 15 July	4	10
16 - 23 July	2	9
24 - 31 July	1	3
1 - 7 August	2	1
8 - 14 August	2	Nil
After 14 August	1	Nil

(a) One farm in Group B was out of production in the 1966 season.

5.3.6 Calf feeding

The general pattern of calf feeding in Survey Group A is twice a day for 4 weeks, and then once a day feeding for 4 weeks. Whole milk is used throughout this time.

---

20. Section 8.2.2,25 discusses the local extension workers ideas on calving dates and suggests that all farmers in the district would benefit by calving their cows after the 1st August.

In 1966 1 farmer in Group A reared calves on cows at the rate of 3 calves per cow. This method provides a considerable saving of labour in the spring, although calves have to be watched for the first few days after they are put on the cows, to see that they are feeding properly. The calves are weaned at about eight weeks, and then the cows are milked normally in the herd with no apparent loss in production.

The farmers in Group B tend to milk-feed calves longer than those in Group A.

The main methods of calf rearing used by farmers in Group B can be classified as follows:

(i) Feed whole milk twice a day for 8 to 10 weeks, 7 farmers.

(ii) Feed whole milk (or skim milk where available) twice a day for 11 to 14 weeks, 6 farmers.

(iii) Feed whole milk twice a day till 4 to 6 weeks and then once a day until 8 to 12 weeks, 6 farmers.

(iv) Feed whole milk and/or some skim milk for 4 months twice daily, 5 farmers.

(v) Rear calves on the cow at the rate of 3 calves per cow, 1 farmer.

The expense, both in feed and labour, for calf rearing on Group B farms is generally higher than on Group A farms, but there is little difference in the quality of the calves.

5.3.7 Pests and diseases

All farms in the survey groups are relatively free from diseases however, bloat, tuberculosis, spring ill-thrift and worms in calves occur.

Table 5.10 shows the methods of bloat control used on the survey farms.

Table 5.10 Methods of Bloat Control

Treatment	Number of farms	
	Group A	Group B
Spray pastures with paraffin at least 3 months per year	2	2
Spray pastures with paraffin 2 months per year	3	4
Paint oil on flanks for 2 months per year	4	1
Oil on water troughs	Nil	6
No treatment - occasional drenching	3	12

Tuberculosis testing was first introduced in the district in 1959, and becomes compulsory in 1969. The average reactor rate for the initial test in the Whakatane County was 22.4 per cent over the years 1962/65.[21/]

21. Bovine Tuberculosis, Issued by the New Zealand Department of Agriculture, Wellington, 15 February, 1966.

Table 5.11 shows the incidence of tuberculosis at the initial test on the survey farms.

Table 5.11 Incidence of Tuberculosis at Initial Test

Incidence rate per cent	Number of farms	
	Group A	Group B
More than 75	Nil	2
50 - 75	2	1
20 - 49	3	2
Less than 20	3	4
Not yet tested	4	16

A spring ill-thrift problem has caused concern on 2 farms in each of Survey Groups A and B. The general impression of farmers and extension officers in the district is that spring ill-thrift is a very serious problem to a few farmers - especially some of those attempting to increase production rapidly.

The spring ill-thrift problem causes production to fall off rapidly in the spring, and also causes cows coats to become dull.

Spraying pastures with copper and cobalt seems to give some temporary beneficial effect.

This problem has generally been noticed on farms where there has been a fairly substantial increase in stocking rate in a particular year, yet it does not occur on all farms where this is done. Although the farms effected by spring ill-thrift have generally made substantial increases in stocking rate in the year they are effected they are not necessarily at high absolute levels of stocking rate. Most of the farms affected have a stocking rate of just over 1 cow per acre, which is no higher than on a number of other farms where the problem has not occurred.

Soldier fly has caused considerable damage to pasture on 2 farms on the drier soils in Group A. There is no known satisfactory control for this pest.

Nine farmers in Group B and 1 farmer in Group A have a lot of grass grub on their farms. In none of these cases is a proper systematic treatment of this pest being carried out.

On the survey farms army worm is generally a problem after flooding.

5.3.8 Stock feeding and conserved feed

5.3.8,1 Wintering methods

Seven of the farmers in Survey Group A use run-offs for wintering their herds. The stock are given a break of grass daily, plus hay, and silage in some cases.

Four Group A farmers winter their herds using a split-herd system at the rate of 2 or 3 cows per acre. Hay or silage is fed out daily.

On 1 farm in Group A block grazing was tried for the first time in the winter of 1966. This largely followed the pattern developed in the Wairarapa.[22/] Stock were concentrated at about

---

22. "Block Wintering", The New Zealand Farmer, August 26, 1965.

100 cows per acre with a back and front electric fence. This meant a rapid clean out of feed and plenty of time for regrowth. Hay was fed out as needed. This block wintering proved very satisfactory and its use is being continued.

On 14 farms in Group B wintering is done by mobbing all the stock together and rotating them around the farm, giving a fresh break of grass every one or two days, plus hay, and/or silage. On 9 farms the stock are set stocked in a mob and fed hay, silage or crop. On 2 farms split wintering is used, and in these cases hay is fed out as needed.

Individual farm details on wintering methods and supplementary feed are given in Appendix B.

5.3.8,2 Supplementary feed

On the farms in Group A there is a growing tendency to reduce the quantity of supplementary feed. This is due to an emphasis on making full utilization of pasture in situ, as it is grown. However, hay and silage are made on most farms, and 2 farmers grow a summer crop. One of these farmers also grows a winter crop. Silage is made in the spring before the weather is suitable for hay making.

The quantity of conserved feed used per cow varies considerably. The range on the farms in Group A is 10 bales of hay plus 0.7 tons silage per cow to 35 bales of hay and 1.5 tons silage per cow.

The quantity of conserved feed used depends largely on the time of calving. With later calving less conserved feed is required as the winter feed demands for dry cows are less than for milking cows.

Conserving less feed means that less feed has to be withheld from the stock in the spring-summer period, and hence more cows can be carried.

In Group B the tendency to reduce the quantity of conserved feed was only apparent on 2 farms. The remaining 23 farmers use a lot of conserved feed, and at the time of the farm visit had no intention of reducing the rate of usage.

All farmers in Group B use hay, 12 farmers regularly make silage, and 4 farmers make it occasionally. Eight farmers crop for supplementary feed each year.

The amount of supplementary feed used on farms in Group B varied from 17 bales of hay per cow to 38 bales of hay plus 4 tons crop per cow.

Overall the picture of conserved feed is in a state of flux. The farmers who are rapidly increasing stock numbers and production are reducing the amount of conserved feed used and are aiming at fully feeding cows with fresh pasture from the time of calving. On a number of farms where the amount of conserved feed used is high, the production per acre is also high in comparison with other farms in the district. Thus it would seem that the feed value wasted in conserving feed is not a critical factor limiting production at present levels, at least on well developed farms. However, conserving feed costs money.

5.3.8,3 Autumn saved pasture

Nine farmers in Group A and 12 farmers in Group B shut up at least 15 per cent of their farms in March or April for autumn saved pasture.

The farmers in Group A who save autumn pasture utilize this in winter, but the farmers in Group B save this feed for the early spring. The result of such early shutting to conserve feed for the spring tends to be a lot of rank dead material with little nutritive value. Some of the farmers are starting to realise the waste involved and are tending to shut up a little later. One farmer in Galatea had such poor pasture species that no growth was made from May till September. Farm Number 11 showed that even in Galatea ryegrass will continue to grow through most of the winter. Thus, by introducing better species there is no need to shut pastures early.

All farmers in Group A, and the 13 farmers in Group B who do not shut autumn pasture (all of whom are situated on the Rangitaiki Plains) shut large areas of their farms in May-June and rely on winter saved pasture for early spring feed.

5.3.8,4 Grazing rotation

The general grazing pattern on farms in both survey groups over the late spring, summer, and autumn period is a controlled rotation with 12 hour grazing. On 2 farms in Group A and 1 farm in Group B, 24 hour grazing is used most of the time.

On 1 farm in Group B the herd is given two paddocks during the day and one at night from August until February. This is to ensure there is always fresh feed available to the cows - a factor which the farmer considers helps to prevent bloat.

Most farmers in Group A and about half the farmers in Group B normally use an electric fence in spring.

All the farms in Galatea have lucerne for grazing as required over the summer and autumn.

5.3.9 Capital

The capital situation has been estimated for 10 farms in Survey Group A and 17 farms in Group B.[23/]

Full details of the capital situation on the survey farms, and the assumptions made in the calculations are given in Appendix B.

Table 5.12 gives a summary of the capital situation on the survey farms at balance date 1965.

From Table 5.12 it can be seen that the progressive farmers in this survey have equities less than the average for the district, indicating that these farmers are more interested in increasing production rapidly than in paying off debts and owning a less productive unit.

---

23. The reasons for not showing the capital situation for the remaining farms are:
    (i) The farmers accounts covered more than 1 farm and thus were unsuitable for use. This applied to 1 farm in Group A and 5 farms in Group B.
    (ii) The accounts were unavailable. This applied to 1 farm in Group A and 3 farms in Group B.

Table 5.12 Capital Situation on the Survey Farms 1965

Item	Survey Group A	Survey Group B	Bay of Plenty average[24]
Range equity %	40.2 - 79.0	30.0 - 94.2	N.A.
Average equity %	57.7	64.7	62.0
Range total capital invested per cow $	328 - 467	364 - 514	N.A.
Average total capital invested per cow $	404	459	388
Range total capital invested per acre $	188 - 500	166 - 465	N.A.
Average total capital invested per acre $	360	279	276

'N.A.' indicates 'not applicable'

The investment figures in Table 5.12 show that on the farms in Group A there is a higher investment per acre, but lower per cow, than on the farms in Group B. This is a result of the higher stocking rates on Group A farms and the larger inputs of capital items to handle the extra stock.

24. Bay of Plenty average figures are for the 1963/64 season as quoted by the New Zealand Dairy Board, Op.cit. These figures have been calculated using standard values, for stock instead of market values as used in this survey, thus they would tend to underestimate the amounts of capital involved.

5.4 Main Farming Systems

5.4.1 Survey Group A

The authors impression of the farms in Survey Group A is that of a dynamic farming system, generally producing at high levels of production.

The main features of farming for high production, apparent on the survey farms, are those aimed primarily at making full utilization of the feed grown. This is done by increasing stocking rates to 1.0 - 1.5 cows per acre depending on the soil type, calving in early August, using less conserved feed, and increasing subdivision so as to be able to graze stock at about 80 cows per acre. The feed supply is also being increased by increasing the application rate of fertilizer to 6 - 7 cwt per acre, applying this in two split dressings, and changing pastures to ryegrass-white clover swards.

The farmers on the high producing units have Herringbone cowsheds to enable them to handle large numbers of stock with as little labour as possible. Hay is the main supplementary feed, and on the highest producing farms the quantity used has been reduced to about 12 bales per cow, plus a little silage. The reduction in the required quantity of conserved feed has been made possible by later calving, and the improved winter grass growth associated with high fertilizer levels and high grazing pressures. The breed composition of many herds on high producing farms is changing towards a

Jersey-Friesian cross.[25/]

All the farmers in Group A are adopting a pattern of farming similar to that outlined above. However, these farmers can be divided into two groups:

(i) Those which are adopting new technology at a rapid rate and consequently making rapid increases in production. These farms will be referred to as the 'fast high producing farms.'

(ii) Those which are slowly adopting the new technology and hence are making slower increases in production. These farms will be referred to as the 'slow high producing farms.'

5.4.1,1 Fast high producing farms

There are 8 farms in this category. Four of these farms were purchased in a run down condition by their present owners within the last 7 years. Development on these farms has concentrated in building highly productive units, initially at the expense of convenience, but this has been improved as development proceeded.

The other 4 fast high producing farms were well established units prior to 1960 but have since proved to be capable of much higher production than their owners thought possible at that time.

The average rate of increase in production on these farms over the five years 1960/61 to 1964/65 was 18.8 per cent per year.

---

25. The reasons for favouring Jersey-Friesian crossbreds were given in Section 5.3.3.

The average rate of application of fertilizer on these farms has increased by 100 per cent from 2.8 cwt per acre to 5.6 cwt per acre, over the six years 1960/61 to 1965/66. Over the same period the average stocking rate increased by 61 per cent, from 0.67 to 1.08 cows per acre, and the average production per acre increased by 67 per cent, from 199 to 333 lb butterfat per acre.

Table 5.13 gives an outline of the average input and output increases within soil groups on the fast high producing farms. This includes the January milking cow numbers per acre, the butterfat production per acre, and the fertilizer applied per acre.

Table 5.13 Stock, Production, and Fertilizer on the Fast High Producing Farms

Soil Group	1960/61			1965/66		
	Cows/acre	Production lb butter-fat/acre	Fertilizer cwt/acre	Cows/acre	Production lb butter-fat/acre	Fertilizer cwt/acre
1	0.41	86	2.0	0.51	139	3.5
2	0.56	118	2.2	0.97	301	6.0
3	0.90	299	4.0	1.31	394	7.0
4	0.74	279	3.0	1.28	418	6.0
Average	0.67	199	2.8	1.08	333	5.6

5.4.1.2 Slow high producing farms

There are 4 slow high producing farms. All of these farmers have owned their farms for more than 10 years.

These farms are all well developed and producing at reasonably high levels of production, however, over the five years 1960/61 to 1964/65 the rate of increase in production only averaged 3.02 per cent per year.

These farms are marked by similar, but much smaller increases and changes to those on the fast high producing farms. There is a greater degree of emphasis on convenience on the slow high producing farms.

Table 5.14 summarizes the average stock, production and fertilizer situation, within soil groups, on the slow high producing farms for the years 1960/61 and 1965/66.

Table 5.14 Stock, Production, and Fertilizer on the Slow High Producing Farms

Soil Group	1960/61			1965/66		
	Cows/ acre	Production lb butter-fat/acre	Fertilizer cwt/acre	Cows/ acre	Production lb butter-fat/acre	Fertilizer cwt/acre
2	0.78	287	4.0	0.97	316	6.0
3	0.78	274	3.0	0.90	313	4.5
4	1.04	369	3.0	1.21	454	5.0
Average	0.88	325	3.3	1.07	386	5.2

The average increase in stocking rate on the slow high producing farms was 22 per cent over the six years 1960/61 to 1965/66. Over the same period butterfat production increased by an average of 19 per cent and fertilizer application rate increased by 58 per cent.

Three of the slow high producing farmers have been on their properties for over 20 years and although they are desirous of having high producing units, they are not making large crash development steps. This is partly because they have always been considered as "good high producing farmers" and they feel there is little need to make large changes on their farms, but rather to make slower steady progress. Also there is not the wide scope for development which was present on the recently purchased run-down farms in the fast high producing group.

The fourth farmer in the group of slow high producing farms has owned the farm for 11 years but is hindered by his family situation from making large scale development steps. This farm is being developed primarily for convenience with small increases in production.[26]

5.4.2 Survey Group B

In contrast to the dynamic farming system apparent on the farms in Survey Group A, Group B farms represent a relatively static situation in which farming patterns are followed which were developed years ago.

The farmers in Group B could be divided into two main categories as follows:

(i) Those farmers who are making some progress towards utilizing modern technology and increasing production. These farms will

---

26. This farm is Case Farm III in Section 6.6.

be referred to as 'progressive low producing farms.'

(ii) Those farmers who are remaining static in production and outlook toward farming. These farms will be referred to as 'static low producing farms.'

5.4.2,1 Progressive low producing farms

There are 9 progressive low producing farms. These farmers all made significant increases in cow numbers, [27] over the six years 1960/61 to 1965/66, but the rate of increase in production was still less than 2 per cent per annum on 8 of these farms. [28] The actual increases in cow numbers were between 5 and 30 per farm with an average increase of 15 cows.

Three farmers who had increased cow numbers by 20 or more are now hindered respectively by labour shortage, cow ill-thrift, and farmer old age.

Table 5.15 summarizes the average stock, production, and fertilizer situation, within soil groups, on the progressive low production farms for the years 1960/61 and 1965/66.

---

27. A significant increase in cow numbers has been arbitrarily defined as 5 or more cows per farm, and a significant increase in fertilizer rate has been defined as 0.5 or more cwt per acre.

28. One of the progressive low producing farmers increased production at a rate of 10.03% per annum. This farm was included in Survey Group B because of a clerical error in the production figures on which the farm selection was based. See Section 4.2.1.

Table 5.15 Stock, Production, and Fertilizer on the Progressive Low Producing Farms

Soil Group	1960/61			1965/66		
	Cows/ acre	Production lb butter-fat/acre	Fertilizer cwt/acre	Cows/ acre	Production lb butter-	Fertilizer cwt/acre
1	0.44	102	2.5	0.51	152	3.3
2	0.55	186	4.0	0.70	217	2.5
3	0.74	229	3.0	0.76	249	4.8
4	0.89	305	2.7	0.99	275	4.3
Average	0.66	206	3.1	0.74	223	3.7

Fertilizer rates of 4 cwt per acre are common on these farms and are frequently applied in single dressings. The average stocking rate on these farms in 1965/66 was 0.74 cows per acre.

Calving is generally before mid July, and relatively large quantities of conserved feed (about 24 bales of hay per cow plus some silage or crop) are used. The pasture species tend to be poorer than on the high producing farms, a result which may be due to the lower stocking rates.

The progressive low producing farmers are generally partly aware of the procedures being used for modern farm development but are not sufficiently confident in them to start rapid development, or else, as in 4 cases, they are hindered from increasing production by some other physical factor.

The overall impression gained by the author of the progressive low producing farms is that although there is potential for large increases in production this will only be slowly achieved if the farmers are left alone. The farmers are interested in current modern farming technology but their rate of adoption is slow under the present circumstances.

5.4.2,2 Static low producing farms

There are 16 static low producing farms. None of these farmers made significant increases in cow numbers over the six years 1960/61 to 1965/66.

Table 5.16 summarizes the average stock, production and fertilizer situation, within soil groups, on the static low producing farms for the years 1960/61 and 1965/66.

Table 5.16 Stock, Production, and Fertilizer on the Static Low Producing Farms

Soil Group	1960/61			1965/66		
	Cows/acre	Production lb butter-fat/acre	Fertilizer cwt/acre	Cows/acre	Production lb butter-fat/acre	Fertilizer cwt/acre
1	0.49	122	3.2	0.45	110	3.2
2	0.52	150	4.4	0.51	122	4.5
3	0.73	214	2.8	0.73	221	3.3
4	0.74	217	2.4	0.73	216	3.0
Average	0.62	176	3.2	0.61	167	3.5

The average stocking rate in the 1965/66 season on the static low producing farms was 0.61 cows per acre. Fertilizer was normally applied at 3-4 cwt per acre in a single dressing.

These farmers tend to be less aware of modern farm development technology and are more set in their farming pattern than the progressive low producing farmers.

These farms are badly understocked and as a consequence pastures tend to be poor as they can not be adequately grazed to maintain a good sward.

The calving date is generally before mid July and hence large amounts of conserved feed are reouired.

There is a large untapped potential for increased production on these farms.

5.5 Conclusion

This chapter has described the resources, management and production on the survey farms and closed with a section on the author's impressions of the main farming systems in the district.

The latter section showed that there are four main farming systems apparent amongst the survey farms, as follows:

(i) Fast high producing units - 8 farms
(ii) Slow high producing units - 4 farms
(iii) Progressive low producing units - 9 farms
(iv) Static low producing units -16 farms

The fast high producing units represent a dynamic farming system where stock numbers, production and fertilizer rates have increased rapidly, while calving dates have been put back to August, and quantities of conserved feed used per cow have been reduced.

All the survey farms are capable of the large rapid increases in production apparent on the fast high producing units, yet under the existing conditions this is not being attained.

Chapter 6 shows the profitability of rapid development, and Chapter 8 discusses the factors which are hindering the low producing farmers from increasing production.

CHAPTER 6

PROFITABILITY OF FARM DEVELOPMENT

6.1 Summary

This chapter discusses various aspects of measuring the profitability of farm development. After introductory comments, the chapter discusses the approaches, historic and projective, which have been made towards assessing the profitability of development. It then deals with the approach and criteria used in this study. The final section of the chapter gives five case farm studies from this survey to show the profitability of farm development.

6.2 Introduction

In a research project studying the methods of development currently being used in a particular area and finding farmers reasons for non-adoption, it is essential to know whether the planned development is profitable to the individual in the post-tax situation. Physical increases in production alone need not be profitable.[1/]

Many social factors may also affect the adoption of a development programme, but this chapter deals only with the economic factors and leaves the discussion of attitudes and family situations to Chapter 7.

---

1. This has been shown in the case of sharefarming by: Sargent, D., Op.cit.

Financially, a development programme may be viewed as a stream of expenditures and receipts, which would not otherwise have been incurred.[2/] Consequently, attention must be focussed on the marginal situation when estimating the profitability of a development programme and not on the enterprise as a whole.

6.3 Approaches to Measuring Profitability

In the analysis of the profitability of development on an individual farm there are two main approaches which may be considered. These are, first, the historic approach based upon improvements already undertaken, and secondly, the projected approach based on the anticipated results of a proposed development programme.[3/]

6.3.1 Historic analysis

The historical analysis deals with factual events rather than with future estimates. It uses the true physical and economic results from a development programme thus allowing for all unknown variables. However a number of difficulties arise from its use in evaluating development programmes which include:

(i) Accounting problems which arise because it is very difficult to separate out normal annual expenditure and development

---

2. Graham, J.V., "The Economics of High Rates of Fertiliser on South Taranaki Dairy Farms", Op.cit., p.83.

3. For fuller information on historic and projected analysis of development projects see: Ward, J.T., "Investment Analysis for Farm Improvement", Agricultural Economics Research Unit, Lincoln College, Publication No.9, 1964.

expenditure from a farmer's accounts, which are generally prepared solely for taxation purposes.

(ii) Financial information is subject to the problem that the unit of account changes with inflation, and market price fluctuations. Some adjustment of the prices which actually occurred is almost sure to be needed.

(iii) A study of past events, no matter how accurate, cannot necessarily be taken as a guide to the future, due to the incidence of changes in technology, market conditions, managerial ability and other factors. If, for instance, it is now known that all historic case studies were technically inefficient, it may not be very helpful to estimate their precise profitability.

6.3.2 Projection analysis

Projection analysis is based on an anticipated development programme.

A projection analysis should proceed through three stages:

(i) Drawing up a physical development programme;

(ii) Transposing this programme into a financial budget;

(iii) Evaluating the result.

The projection analysis method overcomes the problem of price variability as constant prices may be used in the budgets.

The major problem with this method is that the profitability of the outcome of the development being exactly as planned is very slight. This is due to variations in physical, climatic, economic and human factors, as well as changes in technology.

6.3.3 Approach used in this survey

In this study the author is concerned with recommending "proven" development methods. Thus, it is essential to know that the past "proven" methods are likely to be profitable in the future. In estimating profitability in this study, a combination of the historic and projected analysis approaches was used.[4] By making use of historical physical data, allowance can be made for unknown variables which have entered into past development projects. The actual results that have already been attained can be used with a greater degree of certainty, than the writer's projections of future results.

Financial information from farmers' accounts was modified by an index and expressed on the basis of the current year.[5] This gave costs and prices for each year in terms of current costs and prices, thus making the profitability studies as closely applicable as possible to future development projects.

---

4. This combination of historic and projected approaches has been discussed and used by: Cartwright, R.W., "The Potential for Increased Production on Sheep Farms in Wairoa County", Op.cit., p.40, and: Graham, J.V., "The Economics of High Rates of Fertilizer on South Taranaki Dairy Farms", Op.cit., p.87.

5. See Sections 6.5.2 and 6.5.3.

6.4 Methods of Evaluating Profitability

In this survey, the following criteria have been used to evaluate the profitability of development on the case farms:

(i) Maximum overdraft;

(ii) Payback period;

(iii) Present value of pre-tax added cash profits;

(iv) Present value of post-tax added cash profits;

(v) Pre-tax return on investment;

(vi) Post-tax return on investment;

(vii) Reward to owner.

These criteria are discussed in detail below where it is seen that no one criteria can give a completely satisfactory measure of the profitability of development. By taking a number of different criteria however, a good evaluation can be obtained. The evaluation here covers the maximum amount of finance to be borrowed, the time taken to repay this debt, the present value of the added returns to the farmer and the nation from development, and a rate of return on the investment.

There are other criteria, such as, return on capital and internal rate of return, that have been used by other workers to evaluate the profitability of development, but the above measures are considered adequate by the author for this survey.

6.4.1 Maximum overdraft

The maximum overdraft shows the maximum amount of indebtedness that would accrue at any time during the development programme, if development was all done on borrowed capital. This figure is important for some farmers as they are unwilling, or unable, to borrow above a certain level.

The maximum overdraft is an index of the financial feasibility of a plan, rather than its profitability, and as such gives no indication of the extra cash proceeds produced by the programme.

6.4.2 Payback period

The payback period is one of the simplest measures used for evaluating development projects. The payback period is defined as the time it would take the farmer to pay off his overdraft, if he financed his development programme entirely by borrowing, and if he left his personal drawings at the pre-development level. This is of importance to the farmer who wants to know how long it will take for extra funds to become available to himself for consumption - on the assumption that his first priority is repayment of the money borrowed.

The payback period suffers from a number of shortcomings which include:

(i) Size of investment is not considered;

(ii) Cash proceeds earned after the payback date are not included;

(iii) No allowance is made for an alternative use of capital; and

(iv) It fails to take into account the differences in the timing of proceeds earned prior to the payback date.

For a fuller treatment of the payback period see Wadsworth[6/] or Bierman and Smidt.[7/]

The payback period and the maximum overdraft depend largely on the pattern of income and expenditure over the development period, as well as on the amount of taxation exempt capital expenditure made during the development programme. Consequently, they are not direct measures of profitability.

6.4.3 Present value of pre-tax added cash profits

The present value method makes allowance for the time series which is an integral part of any land development project. The use of discounting[8/] to obtain present values of future revenues and costs is essential when calculating cash profits over a number of years.

The present value of an investment can be expressed either as a capital sum where it is called the present value of added cash profits, or as an annual payment where it is called the annual

---

6. Wadsworth, H.A., "Evaluating Farm Investments by Capital Budgeting", Journal of Farm Economics, 14, 5, 1962, pp.1444-1449.

7. Bierman, H., and Smidt, S., "The Capital Budgeting Decision", The Macmillan Company, New York, 1960, pp 16-18.

8. For a full treatment of discounting see: Heady, E.O., Op.cit., Chapter 13.

profit [9] or annuity payment from the investment.

Present value, or the equivalent annuity, can be calculated using pre-tax, or post-tax figures for each year. The pre-tax figures give results useful for comparison with stocks, shares, and interest on mortgages, as these are usually quoted at the pre-tax rate.

The present value method uses a specified interest rate and all future costs and revenues are discounted to their present value via this rate. The annual interest rate is an expression of the opportunity cost of capital. Chisholm gave the following as the two basic determinants of the market interest rate:

> "(1) The time-productivity of capital as a factor of production, and
>
> (2) The time-preference for capital as a factor of consumption." [10]

The time-productivity of capital investment is its rate of growth. The greater the economy's anticipated marginal rate of capital growth, the higher will be the demand for investment capital. This demand is reflected in the market interest rate.

---

9. The cash profits may be either positive, or negative (indicating a loss) depending on the relative significance of costs and revenues.

10. Chisholm, A.H., "An Economic Comparison of Forestry and Agriculture", Discussion Paper No.30, Department of Agricultural Economics and Farm Management, Massey University of Manawatu, 1963, pp 12-13.

The time-preference component for consumption capital arises because individuals place different values on consumption at different points in time. Time-preference for capital normally reflects a preference for present consumption over consumption at some future date. Hence a marginal quantity of present consumption will normally only be foregone for a greater resultant future consumption.

The rate of interest in the economy represents the interaction of time-productivity and time-preference for capital savings.

For an efficient allocation of scarce capital the rate of growth of capital in any investment should be at least equivalent to:

(i) The potential growth rate of capital in alternative investments;

(ii) The satisfaction foregone in postponing additional present consumption.

This interest rate is to be charged to the enterprise as the opportunity cost of capital.

This shows the difficulty of estimating accurately the interest rate which is of vital importance to the present value method of evaluating development programmes.

Other limitations of the present value method are that it gives no indication of the investment required by the project, nor the time taken before the extra net revenue starts to return to the farmer.

6.4.4 Present value of post-tax added cash profits

The present value method has been discussed above in the pre-tax situation. When calculated in the post-tax situation this gives the lump sum amount of tax-free cash which if available now would be equivalent to the retained profits from the proposed development programme. For a farmer to rationally adopt a project it must be profitable to him in the post-tax situation. The pre-tax situation is of greater importance to the nation, as it shows the increase in national income from the development project. The nation can encourage farmers to adopt a project which is profitable in the pre-tax situation by designing the tax structure so as to ensure that these projects are also profitable in the post-tax situation.[11]

6.4.5 Pre-tax return on investment

The pre-tax return on investment may be defined as the annual profit (before tax) of the development programme divided by the capital sum needed initially to avoid having to borrow to undertake

---

11. For comments on designing a national tax structure so as to encourage all profitable projects see: Candler, W.V., "Incentives for Increased Output of Farm Products", Lincoln College Farmers Conference, 1964, pp 10-19, and: Cartwright, R.W., "The Impact of Taxation on the Profitability of Farm Development in New Zealand", Discussion Paper No.46, Department of Agricultural Economics and Farm Management, Massey University, 1967.

the development programme.[12]

When the maximum overdraft is low the return on investment may be very high and tends to infinity when no overdraft is required. A low maximum overdraft may be an indication of slow steps in development, or of little need for large capital inputs because of previous expenditure on the farm.

The return on investment is limited as a profitability criteria in that it cannot be used to rank alternative programmes according to their absolute profits. This is because a high return on investment may be due to a high added cash profit, or to a low added cash profit if capital expenditure is very low.

The return on investment measure is conceptually similar to the rate of return on capital invested in industrial shares or Government stock, and is of importance to the farmer considering where to invest surplus cash.

---

12. Pre-tax return on investment

$$= \frac{r \times PV}{PV_{OD}} \times \frac{100}{1}$$

r = market interest rate
PV = present value of pre-tax added cash profits
PV_{OD} = present value of maximum overdraft
The expression $r \times PV$ gives the present value of the pre-tax development cash profits as an annuity.
PV_{OD} indicates the extra net expenditure incurred as a result of implementing the development programme, i.e. it represents the present value of the investment in the programme.

6.4.6 Post-tax return on investment

The post-tax return on investment 13/ is similar to the pre-tax return on investment shown above but allowance is made for taxation, and thus it shows the final rate of return to the farmer.

6.4.7 Reward to owner

The reward to owner is the post-tax net return from farming, which is equal to the gross cash income less the sum of cash expenditure and taxation. During development this return may be insufficient to meet the farmers personal needs and borrowing is then required. 14/

The reward to owner is increased, as a result of development, by the value of the post-tax added cash profits in the first year of the new equilibrium situation. 15/ This new reward to owner is assumed to reoccur indefinitely thereafter.

---

13. Post-tax return on investment

$$= \frac{r \times PV_p}{PV_{OD}} \times \frac{100}{1}$$

r = market interest rate
PV_p = present value of the post-tax added cash profits
PV_{OD} = present value of maximum overdraft.

14. See Section 6.5.11 for the minimum levels of reward to owner used in this study.

15. The post-tax added cash profit is the additional tax free cash to the farmer at the end of each year compared to the reward to owner in the base year. This may be negative or positive depending on the relative expenditure and income. This cash is used firstly for repayment of development overdrafts and secondly for increasing the reward to owner.

6.5 Information Used for Profitability Calculations

A combination of historic and current information has been used in this study.

6.5.1 Physical information

Historical physical information has been used. This information was obtained by the author from farmers' accounts, records, and by interview with the farmers.

6.5.2 Costs

Farmers accounts were examined and costs were taken from these for each item of expenditure. The historic costs were adjusted to the 1966 level by using a price index.[16/] Dairy stock costs were taken at the value for May 1966 as shown in Table 6.1.[17/]

6.5.3 Product prices

In the absence of reliable estimates of future dairy prices, the author used current prices as the "best" available estimate of future prices.

The butterfat price used was that paid by the Rangitaiki Plains Dairy Company in the 1965/66 season. The price for whole

---

16. The price index for groups of inputs on dairy farms in New Zealand was obtained by personal interview at the New Zealand Dairy Production and Marketing Board. The figures used in the index are given in Appendix D.

17. Stock prices for the Bay of Plenty were obtained from the New Zealand Dairy Production and Marketing Board. Pers. Comm.

milk was $0.3596 per lb butterfat, and for cream supply the price was $0.2929 per lb butterfat.

Income from sheep and pig sales, where applicable, were taken at book value as the information from farmers accounts was generally insufficient to be able to separate stock classes and hence to re-price them. Sheep and pigs contributed such an insignificant proportion of the income that any error arising from this source would be very small.

Dairy stock prices used were those for May 1966 as shown in Table 6.1.[18]

Table 6.1 Costs and Prices of Dairy Stock in the Bay of Plenty in May 1966

Class of stock	Price range May 1966 $	Price used in this study $
Yearling heifers	54 - 66	60
In-calf heifers	80 - 112	96
Dairy cows	86 - 118	102
Boner cows - heavy	42 - 50	42
Boner cows - light	36 - 40	
Bobby calves	N.A.	5

'N.A.' indicates 'not available'

---

18. *Ibid.*

6.5.4 Stock replacement rate

For the pre- and post-development years, which represent static situations, a wastage rate of 24 per cent (4 deaths and 20 culls) was assumed for this study.[19/]

For the development years the replacement rate was taken as that actually occuring on the farm, according to the farmers cattle account.

6.5.5 Calves

As the number of bobby calves sold was not shown in most farmers' accounts, and as no index was available to the author for converting the return from bobby calf sales to a 1966 basis, the following assumptions were made concerning bobby calf sales, and calves reared in the static years.

Thirty three calves kept per 100 cows which gives 1 bull and 27 yearling heifers, and, in turh, gives 1 bull and 24 in-calf heifers. It was also assumed that 63 bobby calves were sold per 100 cows.[20/]

---

19. New Zealand Dairy Production and Marketing Board, "Farm Production Report and Summary of Board's work, 1962/63 Season", Wellington, 1964, No.39. This report gave the national wastage rate as 23.3% for herds stocked above 80 cows per 100 acres. As stocking rates were generally high on the farms on which profitability studies were made a wastage rate of 24% has been assumed.

20. These assumptions are based on figures given by the New Zealand Dairy Production and Marketing Board, Report No.23, for wastage of calves and yearlings, together with the need to maintain a herd with a 24% wastage rate.

The number of calves reared during the development years has been taken from the farmers' cattle accounts. Where the number of calves reared has been higher than that needed for maintaining a static herd, allowance has been made for reducing the sale of bobby calves.

6.5.6 Standard values

All stock added during the development years have been entered at zero standard value, thus making use of the government livestock incentive in the 1966 Budget.[21]

6.5.7 Wages

All wages paid have been included as tax deductible even where some have been paid as wages to labour for capital improvements and as such are not legally tax-deductible.[22] The reason that all wages paid were included together was that in many cases farmers' accounts did not make this distinction clear.

6.5.8 Taxation deductions

To increase the applicability of the study, all farms have been credited with tax deductions of $1,860 or a man, his wife and two children, and $300 of life insurance. The tax rebate was 10 per cent up to a limit of $200, and social security rebate was $208.

---

21. Lake, H.R., "Budget 1966", Government Printer, Wellington, 1966, pp 10-11.

22. Items for which extra labour is non-tax deductible include shed replacement and building of piggeries.

6.5.9 Mortgage repayments

In the profitability calculations no allowance has been made for interest or principal repayments on any previous mortgages on the property, other than to assume these are financed out of the farmers personal drawings.[23]

6.5.10 Interest

Interest has been calculated at 6 per cent on overdrafts incurred during the development programme, and has been charged to the following year.

6.5.11 Level of reward to owner

The profitability studies in Section 6.6 have been made at two levels of reward to owner during the development period. Firstly at a minimum of the base year level, and secondly at a minimum of $2,000. The first case allows for situations where the farmer is unable or unwilling to reduce his personal drawings, and the second case allows for farmers who are able and willing to do so, and who are thus able to reduce the level of borrowing required for development.

---

23. If there are substantial interest payments included in personal drawings then there would be an offsetting reduction in tax liability. The author has not attempted to explore all the situations which could arise.

6.6 Case Farm Studies

6.6.1 The case farms

Five farms were selected by the author to present as case farm studies to show the profitability of development.

The farms selected were chosen because they covered the range of soil types and development procedures, required on farms in different areas of the Rangitaiki Plains and Galatea. They also covered a range of pre-development levels of productivity.

Only 5 of the farms in Survey Group A were suitable for making profitability studies. The reasons for farms in this group being unsuitable were:

(i) Accounts covered more than 1 farm - 2 farms.

(ii) Accounts unavailable for the last six years - 2 farms.

(iii) Extra land had been purchased during the development period - 3 farms.

Four of the 5 suitable farms in Group A all had a similar development pattern, and were all on the same soil group. Thus the author decided to only report 2 of these farms in the profitability studies.

The 5 farms in the profitability studies are:

(i) Three suitable farms from Group A;

(ii) One farm from Group B;[24]

---

24. This farm was selected in Group B because of a clerical error in the production figures initially supplied to the author (see Section 4.2.1).

(iii) One farm from the Pre-Survey Group.

The author considers that these 5 farms give a reasonable coverage of development methods and results seen on the farms in this survey.

Three of the case farms were purchased by the present owner within the last six years and the first year of ownership has been taken as the base year from which development began. In these cases particularly, adjustments had to be made to initial stock levels in order to place the farm on a static basis prior to the development outlined in this study. The other 2 case farms had been owned for 10 and 15 years respectively.

Tables 6.2 and 6.3 summarize the profitability of development on the 5 case farms.[25/] These tables show that in 4 cases (I, II, IV and V) the development programme proved to be highly profitable to the farmer.[26/] In the fifth case (III) the development

---

25. Profitability was calculated on the computer for the criteria outlined in Section 6.4.

26. The following basic steps, in order of priority, emerged from these case farms for profitable development.
    (i) Make large increases in stock numbers by either purchasing stock or rearing extra replacements in order to fully utilize all other inputs.
    (ii) Increase pasture production by heavy (6 + cwt/acre) applications of fertilizer, and drainage where required. Oversowing may be needed, or cultivation for very poor pastures.
    (iii) Substitue hard work for convenience in the early years of development.
    (iv) Improve sub-division and water reticulation so as to be able to graze 50-100 cows/acre with water troughs in each paddock.
    (v) Add Herringbone cowshed and extra labour when required to efficiently handle the extra stock.

Table 6.2 Profitability of Development when the Reward to Owner was Set at a Minimum of the Base Year Level

	Unit	Case Farm I	Case Farm II	Case Farm III	Case Farm IV	Case Farm V
Physical Information						
Area	Acres	161	105	165	185	195
Soil group		2	2	3	4	1
Percentage increase production	%	160	112	14	107	74
Profitability Criteria						
Pre-tax added cash profit	$	10865.2	2712.0	-521.8	9881.4	3790.0
Post-tax added cash profit	$	5807.5	1463.2	-109.6	4847.8	2457.8
Pre-tax return on investment	%	168.3	248.4	-Inf	53.6	Inf
Post-tax return on investment	%	86.3	129.0	-Inf	23.2	Inf
Maximum overdraft	$	6086.6	1051.6	Inf	16221.4	Nil
Payback period	Years	6	5	Inf	8	Nil
Present value of pre-tax added cash profits	$	135,906	36,564	-Inf	114,948	53,660
Present value of post-tax added cash profits	$	69,378	18,986	-Inf	49,838	34,784
Taxation						
Percent of present value of added cash profits taken by taxation	%	48.8	48.1	Nil	56.6	35.3

Note: 'Inf' indicates 'infinite'

Table 6.3 Profitability of Development when the Reward to Owner was Set at a Minimum of $2000

	Unit	Case Farm I	Case Farm II	Case Farm III	Case Farm IV	Case Farm V
Physical Information						
Area	acres	161	105	165	185	195
Soil group		2	2	3	4	1
Percentage increased production	%	160	112	14	107	74
Profitability Criteria						
Pre-tax added cash profit	$	10865.2	2712.0	273.6	9881.4	3790.0
Post-tax added cash profit	$	5807.6	1463.2	296.2	4847.8	2457.8
Maximum overdraft	$	5331.4	Nil	Nil	6147.4	Nil
Payback period	years	6	Nil	Nil	2	Nil
Present value of pre-tax added cash profits	$	135,524	36,658	-10,560	117,060	53,660
Present value of post-tax added cash profits	$	69,478	19,040	-6,416	50,762	34,784
Taxation						
Percent of present value of added cash profits taken by taxation	%	48.8	48.1	-39.3	56.6	35.3

programme was profitable.[27/]

Given reasonably intelligent investment development is likely to be highly profitable on most farms on the Rangitaiki Plains and Galatea. However, Case Farm III illustrates that development can be unprofitable if expenditure is mainly on non-productive capital items.

Appendix E gives a full outline of the development on each of the case farms. Summarised budgets for income and expenditure for each year of the development programme for each farm are also given. All figures have been quoted after adjusting the farmer's accounts to a 1966 basis.

6.6.2 Effect of taxation on profitability

Taxation reduced the present value of the added cash profits of the profitable programmes by between 36 and 57 per cent. These figures are lower than those found by Cartwright for the development of hill country sheep farms.[28/] They do however, represent a very

---

27. The main reason for this fifth development programme being unprofitable was that expenditure had been mainly on capital items, while there had been very little increase in stock numbers. The farm was re-subdivided, a new water reticulation scheme installed, 17 acres of pasture renewed, an implement shed built, and an extra half labour unit employed. With all these non-productive items there was only a 15% increase in cow numbers since the 1961/62 season. In fact this programme was aimed at convenience not profitability.
The expenditure on this farm would be regarded as "development" by many farmers, it is not however "development" in the sense of the other 4 case studies, since it was evidently not designed to lead to a substantial increase in production.

28. Cartwright, R.W., "The Impact of Taxation on the Profitability of Farm Development in New Zealand", Op.cit.

significant proportion of the extra income earned by developing farmers, and reinforce the case argued by Candler[29/] and Cartwright[30/] for a fundamental alteration of the income tax laws as applied to farmers.

Taxation reduced the loss from the unprofitable development programme by 39 per cent.

---

29. Candler, W.V., "Incentives for Increased Output of Farm Products", Op.cit.

30. Cartwright, R.W., "The Impact of Taxation on the Profitability of Farm Development in New Zealand", Op.cit.

CHAPTER 7

SURVEY RESULTS - PART I

7.1 Introduction

This chapter discusses the background information to the main survey results. It deals first with factors relating to development. These include farmer attitude to development and extension services, farmer knowledge level, credit position, family situation, and risk aversion. Next, the chapter discusses the local extension officers views of needed husbandry changes for increased production. These views are dealt with under the following subheadings : farmer confidence, technical knowledge required, methods of extension used, and, finally, the relevance of the current extension aims is shown in relation to the needs of Group B farmers.

The reader is reminded that the results of this chapter are based primarily on information obtained by the author from a days interview with each of the survey farmers. Additional information however was obtained by subsequent contact between the author and the survey farmers [1/] by means of a telephone survey with a random half of the farmers in each group.

---

1. See Section 4.4.4.

7.2 Factors of Significance in Relation to the Rate of Development

In agriculture there is a very close inter-relationship between the firm and the household. This means that the maximisation of profits is but one aspect of the maximisation of satisfaction; the cash return constituting only one 'consumption good'.[2] The close inter-relationship between the firm and household means that the situation in the household has a far greater effect on the firm (the farm) than in other businesses where firm and household are well separated. Social factors such as the family situation, personal attitudes towards borrowing, and other personal values play a very important role alongside the purely economic aspects in farm development. Attitudes which may affect the rate of development on the survey farms are discussed below.

7.2.1 Farmer attitude to development

The farmers interviewed in Survey Group B varied considerably in their attitude towards farm development. All the farmers recognised the fact that their properties could produce more butterfat per year than at present. There was, however, wide variation between individual opinions of the ultimate production potential of the land on one hand, and the level to which it was actually worthwhile increasing production on the other. The maximum production potential stated by the farmer was often lower than that already

---

2. For a full discussion on the firm-household relationship in agriculture see: Heady, E.O., Op.cit., Chapter 14.

being achieved on some farms on the same soil type. This shows a breakdown in the spread of knowledge concerning production figures or, perhaps, a refusal to accept published production figures.

The farmers in Group A felt unable to estimate their production in 10 years' time. Generally they saw great prospects for rapid increases in production. The farmers in Group B however, generally suggested much lower and more definite production limits.[3]

The farmers in Group B expressed the following attitudes towards farm development:

(i) Farmers who were interested in development but who lacked technical knowledge and confidence as to how to develop, (9 farmers).

(ii) Farmers who were interested in, and knew how to develop but were hindered by some physical factor, (5 farmers).

(iii) Farmers who were interested in development but who lacked technical knowledge and confidence, and were also hindered by some physical factor, (6 farmers).

(iv) Farmers who were satisfied with the status quo and were uninterested in, or sceptical of, present development methods, (5 farmers).

---

3. Attitudes of survey farmers to production levels are further discussed in Section 8.2.2,21.

The number of farmers in this fourth category suggests that only 20 per cent of farmers who are increasing production at a slow rate are held up by a lack of interest in development per se. Sixty per cent of farmers need technical advice and/or boosting of their confidence, while 64 per cent require adjustment of physical factors.[4] There is of course, some overlap between these last two groups.

7.2.2 Attitude towards extension services

7.2.2,1 Use of direct extension services

During the farm visits the author asked about the use of direct extension services and the value of the Rangitaiki Plains Demonstration Farm. Table 7.1 shows the use of direct extension services by farmers in Group B.

Table 7.1 Use of Direct Extension Services by Group B Farmers

<table>
<tr><td colspan="2">No direct contact in last 5 years</td><td colspan="3">Some direct contact in last 5 years</td></tr>
<tr><td rowspan="2">Willing to talk to extension officer if he called</td><td rowspan="2">Not interested in talking to extension officer</td><td colspan="2">For extension purposes</td><td rowspan="2">For flood relief only</td></tr>
<tr><td>Regular direct contact</td><td>Occasional direct contact</td></tr>
<tr><td>8 farmers</td><td>4 farmers</td><td>3 farmers</td><td>7 farmers</td><td>3 farmers</td></tr>
</table>

4. Physical factors hindering increased production include such items as sharemilking agreements, old age and ill health, labour shortage, cow ill thrift and flooding risk.

All farmers showed a willingness to talk freely and discuss problems and development possibilities with the author during the survey.[5]

Over the past five years less than half the farmers in Group B have made direct use of extension officers for gaining information on improved management of their farms. Farmers hesitated in calling on an extension officer for the following two main reasons:

(i) They did not personally know the extension officers as people with whom they could freely converse;

(ii) They did not clearly recognise problems on their farms, and hence were unable to express 'felt difficulties' in words to another person.

Even if they didn't get any direct help, it would be a great advantage to such farmers if they were put into such a situation that they began to clearly formulate their problems and tried to express them to an extension officer.

7.2.2.2 Type of direct extension services used

Over the past five years 10 farmers in Survey Group B have received direct advice from extension officers. All of these farmers used the Department of Agriculture Farm Advisory Officers, and 8 farmers used the Dairy Board Consulting Officer. Only 1 farmer in

---

5. Even the farmers who were satisfied with the status quo were willing to talk freely with the author about development possibilities although they did not consider it was personally worthwhile to increase production.

Group B was a member of the Farm Improvement Club. Four other farmers had considered the possibility of joining the Club, but were unable to do so at that time. Since then 3 of these farmers have made use of other direct extension services. Most of the other farmers in Group B had not considered the value of the Farm Improvement Club, and 6 were only vaguely aware of its existence.

This failure amongst farmers in Group B to use direct extension services was in marked contrast to the farmers in Group A.

Over the last five years all the farmers in Group A had direct contact with Department of Agriculture Farm Advisory Officers, 11 of the 12 farmers had direct contact with the Dairy Board Consulting Officer, and 8 were members of the Farm Improvement Club.

When questioned about the value of the Farm Improvement Club, the replies of farmers in Group A fell into two main classes:

(i) The farmer has to think more carefully before making important decisions. As the farmer talks over problems with an advisory officer, the pros and cons of a decision are clearly formulated rather than remaining indecisive, (5 farmers).

(ii) The Club boosts a farmer's confidence and encourages him towards increasing production. This generally arises through the advisory officer pointing out how much surplus feed there is available and suggesting increased stock numbers and other complementary inputs, (3 farmers).

7.2.2,3 Rangitaiki Plains Demonstration Farm

Prior to the survey only 3 farmers in Survey Group B had actually visited the Demonstration Farm. Another 14 farmers were interested in the project, but up until the time of the interview with the author they had not visited the farm. The remaining 8 farmers showed no apparent interest at all in this project.

With respect to the Rangitaiki Plains Dairy Company Newsletter (which includes information about the Demonstration Farm) the farmers in Group B could be classified as follows: 6/

Read with interest	10 farmers
Casual glance	8 farmers
Not read at all	7 farmers

Thus, it can be seen that in its present form the material in the Dairy Factory Newsletter is of regular value to less than half the farmers in Group B. Another one-third of the farmers may occasionally gain some benefit.

Again this is in marked contrast to the farmers in Group A where 6 farmers had visited the Demonstration Farm prior to the interview, and another 2 intended to visit it.

---

6. This classification has been based on the farmers comments, and their awareness of major items discussed in the newsletters immediately prior to the authors interview. Thus to be classified "Read with interest" a farmer had to say he was interested in the Newsletter and reveal some knowledge of topics recently discussed in the letter.

The following replies were given by farmers in Group A concerning the value of the Rangitaiki Plains Demonstration Farm:

(i) It gives a lead in the district by showing what can be produced and introduces new ideas thus unconsciously giving a lead to farmers, (6 farmers).

(ii) It provides the incentive to keep one's own production at least as high, (1 farmer).

(iii) It is of no direct value, (3 farmers).

(iv) It is of no direct value due to being in a different geographical area, (2 farmers).

All the farmers in Group A read the Rangitaiki Plains Dairy Company Newsletter with interest. This reflects their more generally enquiring and alert attitude than the farmers in Group B.

In May 1967 the author telephoned 6 Group A and 13 Group B farmers (a random half of farms in each survey group) and obtained further information on the farmers visits to the Demonstration Farm.

Table 7.2 gives the farmers replies from the telephone survey to the question: "How many times have you visited the Rangitaiki Plains Demonstration Farm?"

Table 7.2 Farmers Attendance at Rangitaiki Plains Demonstration Farm Field Days up to May 1967

Survey Farmers	Never visited	1 to 3 visits	More than 3 visits
Group A	1	1	4
Group B	6	4	3

In the year following the authors visit to each survey farm, 2 farmers in the telephone survey sample from Group A, and 5 farmers in the telephone survey sample from Group B made their first visit to the Demonstration Farm.

7.2.2,4 Use of indirect extension services

Gathering information regarding the use of indirect extension services was overlooked during the main survey. This was rectified in the telephone survey referred to above. The information obtained is presented in Table 7.3 and the following text.

The only radio farming programme to which farmers listened was the 12.30 p.m. National Broadcast.

All farmers contacted had television sets, but because 'Country Calendar' programme clashes with the time of church services on Sunday evenings, farmers were not asked whether they watched it as their answer would only reflect whether they attended church. All farmers, however, expressed interest in this programme, irrespective of whether or not they watched it.

Most farmers in Group A are members of the Whakatane Farm Improvement Club, and feel this makes discussion group membership redundant. They consider that the Club advisor can get all the ideas of the other fourty-odd farmers in the group and, having sorted these out, give the best to each farmer individually.

Only 1 farmer contacted in the telephone survey was currently a member of a discussion group. The farmer belongs to Group B and only recently joined the discussion group but is finding it to

Table 7.3 Farmers Use of Indirect Extension Services

Question:	"What farming journals do you receive?"			
Answer:	1 Journal	2 Journals	3 Journals	4 or more Journals
Group A	Nil	Nil	2	4
Group B	2	6	3	2

Question:	"What type of articles do you prefer?"				
Answer:	No comment	Success stories	General farming	National economic aspects	Wide range of subjects
Group A	Nil	1	2	Nil	3
Group B	5	2	5	1	Nil

Question:	"What radio farming programmes do you listen to?"		
Answer:	Listen regularly	Listen occasionally	Never listen
Group A	1	3	2
Group B	1	7	5

Question:	"Have you been to the Ruakura Farmers Conference in the last 5 years?" and "Did you go to the Whakatane/Galatea Farmers Conference last year?"	
Answer:	Attended Ruakura Farmers Conference in last 5 years	Attended Whakatane/Galatea Farmers Conference last year
Group A	5	6
Group B	5	8

Question:	"If a monthly discussion group was established amongst your friends, with an extension officer present, would you be willing to join it?"		
Answer:	Very interested	Hesitant	Not interested
Group A	1	2	3
Group B	7	5	1

be of great value.

7.2.3 Farmer knowledge level

During this survey the author noticed a considerable lack of knowledge amongst farmers in Survey Group B concerning many aspects of farm development. This lack of knowledge in one form or another, together with the integrally related and consequent lack of confidence in proceeding with development, is the major factor hindering increased production on 9 farms, and is of great importance on another 6 farms, out of the 25 in Group B.

The lack of knowledge could be subdivided, first, into two categories, both of which are generally present on most of the farms concerned:

(i) Lack of knowledge of the services available to farmers, in particular to the availability of extension services and finance.[7]

(ii) Lack of technical knowledge as to the steps to take in development.[8]

The comparative ignorance amongst farmers in Group B is in marked contrast to the more progressive farmers in Group A who have acquired the necessary knowledge and are developing their farms. In many cases Group A farmers had only recently acquired this

---

7. For a fuller discussion on the lack of knowledge of services available to farmers see Section 8.2.2,1.

8. See Section 8.2.2,2 for a discussion of the technical knowledge lacking on the survey farms.

knowledge from extension workers.

The wide variation in the level of farmer knowledge reveals either a breakdown in extension methods, or that extension resources are simply inadequate to meet the need for farmer information.

7.2.4 Farmer credit position

7.2.4.1 Equity situation

A summary of farmers' equity is given in Table 7.4.[9/]

The equity was calculated for 16 farms in Survey Group B. Only 4 of these had an equity of less than 50 per cent. In Group A the equity was calculated for 10 farmers of whom 3 were below 50 per cent.

Table 7.4 Summary of Farmers' Percentage Equity 1964/65

Survey Group	Minimum equity	Mean equity	Maximum equity
Group A	40.2	57.7	79.0
Group B	30.0	64.7	94.2

The farmers in Group B with low equity had differing reasons for this from those in Group A. In 2 cases part or all of the property had only recently been purchased and there was a high mortgage. In another case the farm was purchased with the help of the

9. See Section 5.3.9 for a discussion on the capital situation on the survey farms.

Maori Affairs Department on more generous credit terms than are normally available. The fourth farmer with an equity of less than 50 per cent purchased the farm 14 years ago, but mortgage repayments had been slow and there had been little capital build-up.

The Group B farmers generally had a conservative attitude to borrowing, and were more concerned with paying off debts as quickly as possible than with spending cash on development. This was contrary to the general tendency amongst Group A farmers who were more interested in increasing productivity than in reducing indebtedness.

7.2.4,2 Attitudes towards borrowing

Seven farmers in Survey Group B expressed doubts concerning borrowing. Three of these farmers were men over 45 years of age who had witnessed the depression years and still had a fear of depression.

One farmer refrained from further borrowing because he had a very poor financial arrangement. He had entered the farm three years ago with a high vendor mortgage ($24,000), having insufficient cash at the time of purchase to obtain a loan from the State Advances Corporation. The rate of repayment was high ($2,200 per year) and hence he was in too insecure a position to take on further debts. This farmer would be in a much better position were he to re-finance on a 25 year table mortgage basis now that his equity has risen.

Three farmers refrain from borrowing because of the terms offered. These farmers are all in Galatea where there is an innate fear of a dry season. Due to this, farmers won't borrow because if a drought ensued they may be unable to pay their commitments in any one year. This would suggest the need for a revision of terms of borrowing whereby repayments (both interest and capital) could be suspended in any year which is declared a natural disaster season. As farms develop the consequences of drought will be much less severe, and thus, lending institutions would appear to be taking little extra risk in making this provision which would encourage these farmers to borrow for development.[10/]

Subject to the provision that any proposed development is both profitable and congonial, the remaining 18 farmers in Group B indicated a willingness to try to borrow finance for development. However, they were not sufficiently convinced that the development possibilities they could currently see on their farms would be profitable, and hence they had not attempted to borrow finance.

7.2.5 Farmer family situations

Vroom[11/] has said that there is considerable anecdotal and experimental evidence which suggests that anxiety impairs work

---

10. The reasons expressed here for the hesitancy of farmers to borrow finance are the same as some of those suggested by Lewis in Australia: Lewis, J.N., "Credit Facilities for Agriculture", Quarterly Review of Agricultural Economics, VIII, 4, 1955, p.160.

11. Vroom, V.H., "Work and Motivation", John Wiley & Sons, Inc., New York, 1964, p.207.

performance. Anxiety caused by ill health or tension in the home is thus likely to impair the working capacity of a farmer.

On 3 farms visited in Survey Group B the family situation was tense and unhappy. This had an apparently adverse effect on the farmer's working capacity.

On the other farms visited the family situation was happy, or at least not noticeably tense or unhappy.

Two farmers were each sending two children away to boarding school at an annual cost of ∅1,200-1,400 per farmer. This had a considerable effect on the level of personal drawings and, consequently, on cash available for development. In one case the money, if available, would have been spent on farm development. In the other, less cows would have been milked because the farmer's goal is to work only for a subsistence level of production.

The more progressive farmers in Group A have, on average, better family situations than those in Group B, and this, in turn, is conducive to better work.[12]

Table 7.5 shows the farmers' family responsibilities and Table 7.6 shows the range of farmers' ages.

---

12. The author would not necessarily imply that the better family situation on the farms in Group A is the cause of the more progressive outlook and better work, but he would suggest that the former is at least a contributing factor to the latter.

Table 7.5 Farmers' Family Responsibilities

Survey Group	No children to support	Young family to support	Teenage family to support
Group A	3 farmers	7 farmers	2 farmers
Group B	5 farmers	9 farmers	11 farmers

Table 7.6 Farmers' Age Range

Survey Group	Less than 35 years	35-50 years	More than 50 years
Group A	6 farmers	4 farmers	2 farmers
Group B	10 farmers	10 farmers	3 farmers

It can be seen that in both groups there is a high proportion of young farmers although, on average, the farmers in Group B are older and have substantially older families than the farmers in Group A.

Beal and Bohlen in discussing the differences among individuals in the rate of adoption of new practices, state that non-adopters:

> "have the least education and are the oldest. They participate the least in formal organisations, co-operatives and government agency programmes. They take the fewest farm papers and magazines and receive and read the fewest bulletins."13/

13. Beal, G.M., and Bohlen, J.M., "The Diffusion Process", Report assembled by the sub-committee for the Study of Diffusion of New Ideas and Farm Practices of the North Central Rural Sociology Committee, Mimeo.

These writers suggest that the rate of adoption is a function of farmer age and education level. This idea is not fully supported by this survey, as 40 per cent of the farmers in Group B were under 35 years of age and 2 farmers in this group have had a university education. This illustrates that the problem of slow and non-adoption of new practices is not simply a result of old age.[14/]

7.2.6 Risk aversion

Several methods of risk aversion were apparent on the survey farms. The farmers in Survey Group B tend to keep as debt free as possible and keep large reserves of supplementary feed. The farmers in Group A frequently use run-offs to reduce risk. This latter method means that Group A farmers are able to avoid risks and yet still rapidly increase production, whereas the methods used by Group B farmers tend to hold production static.

Eight out of 12 farmers in Group A use a run-off to help overcome risks whereas only 8 out of 25 farmers in Group B have run-offs.

Seven of the 12 farmers in Group A had a much better collateral background than all except 1 farmer in Group B.[15/] This may well account for some of their greater confidence towards borrowing, and the availability of finance to them.

---

14. Section 8.4 shows that this is the case on 4 survey farms but it is not the main factor in this survey.

15. Collateral background refers to the farmer's and his families security and reputation as a sound investment.

7.3 Extension Officers Views of Needed Husbandry Changes for Increased Production

After the survey work for this thesis had been completed the author discussed with the local extension officers their philosophy of farming, and the farming practices they are trying to change in order to increase district production. This was done to permit a comparison of these goals with the needs of farmers in Survey Group B.[16]

Extension workers in the district feel that the basic need is to increase farmers confidence as to what can be achieved, and to provide the required technical knowledge.

Extension workers aims are discussed in greater detail below.

7.3.1 Confidence

Extension workers feel that confidence can be inspired by a number of means which include:

(i) Talking with the farmer and encouraging him to take action on his ideas. This will help the man who has some ideas of development but is unsure of its value. A decision to act can be more readily made after someone has clearly formulated the programme and shown its profitability.

---

16. This discussion was delayed until after the survey as otherwise it could have influenced the author's own opinions and attitudes towards the survey farms.

(ii) Informing the farmer as to what has been achieved on similar neighbouring farms and describing how he too can greatly increase production.

(iii) Encouraging the farmer to improve feed supply, and thus giving him the confidence to more than proportionately increase his stocking rates.

7.3.2 Knowledge

Extension workers feel that improved technical knowledge is required with respect to:

(i) Low stocking rate;

(ii) Low per cow production.

These two causes of low production are discussed below.

7.3.2,1 Low stocking rate

Low stocking rate can only be overcome by increasing stock numbers. This can be done by rearing extra replacements or purchasing stock. In order to handle the extra stock efficiently such items as a Herringbone cowshed or extensions to an existing shed, and extra labour may be needed. Improved facilities and layout contribute toward making the most efficient use of labour, and thus, improved races, water supply, and extra subdivision may be required. These items all require capital and this frequently has to be borrowed. Thus, for development, finance must be available on terms satisfactory to the farmer in view of his previous commitments.

7.3.2,2 Low per cow production

The per cow production is frequently low on the farms on the Rangitaiki Plains. The average on Group A farms was 327 lb butter-fat per cow, and for Group B 284 lb per cow in the 1965/66 season. For the Bay of Plenty region in 1963/64 the average was 273 lb per cow - the second lowest regional figure in New Zealand.[17]

The per cow production is believed to be low not because of poor genetic merit, but rather because of poor spring feeding. Thus, although the use of artificial breeding, production culling, and good milking technique are recommended, they are considered secondary to the level of spring feeding in affecting annual per cow production. Poor spring feeding can be overcome by later calving and changing pasture species.

Later calving helps to fit cow requirements closer to seasonal grass growth. The recommended change in pasture species is from paspalum or browntop to ryegrass-white clover swards. This may have to be accompanied by drainage, manure and regrassing. A dressing of about 6 cwt of potassic superphosphate per acre is generally required to keep a good pasture composition in a high producing sward. Ariki ryegrass and white clover seem to be forming the best pastures at present. The other ryegrasses do not persist in this district because of stem weavil attack. Ariki ryegrass

---

17. New Zealand Dairy Board, "A survey of the economic structure of factory supply dairy farms in New Zealand in 1963/64", Op.cit., p.14.

however, because of its vigorous summer growth, has been able to overcome the stem weavil attack and has persisted.

The renewal of paspalum sodbound pastures requires ploughing. The use of an intermediate crop of Italian ryegrass for a year has proved most satisfactory in the destruction of paspalum.

7.3.3 Methods of extension used

The local extension officers of the Department of Agriculture, Dairy Board, and Farm Improvement Club are mainly extending their ideas on the needed husbandry changes by personal visits to farms. Fifty seven suppliers to the Rangitaiki Plains Dairy Company receive monthly or bi-monthly visits from the Farm Improvement Club Advisors.

In addition to the individual direct contact services there are three discussion groups amongst suppliers to the Rangitaiki Plains Dairy Company. Other extension services include local farmer conferences, radio, newspaper articles and farming journals.

7.3.4 Relevance of current extension work to Group B farmers

Table 7.7 shows the number of farmers in Survey Group B making use of direct extension services, and summarises the relevance of the present extension officers ideas to these farmers.

It can be seen that 9 farmers are prevented from developing solely by a lack of knowledge and confidence. This supports the above presented ideas of the local extension officers.

Three farmers who have had direct contact with extension workers over the past five years are still primarily hindered from increasing production by a lack of knowledge and confidence. Thus even when direct contact has been made it appears sometimes to be insufficient to allow farmers to feel confident about expanding production.

Table 7.7 Use and Relevance of Present Direct Extension Work for Group B Farmers

<table>
<tr><td colspan="3">Farmers that have had <u>no</u> direct contact with extension officers for advisory purposes for the last 5 years
15 farmers</td><td colspan="3">Farmers that have had direct contact with extension officers for advisory purposes over the last 5 years
10 farmers</td></tr>
<tr><td rowspan="2">Farmers with sufficient knowledge for development but hindered by some physical factor
5 farmers</td><td colspan="2">Farmers who lack knowledge and confidence for development</td><td rowspan="2">Farmers with sufficient knowledge for development but hindered by some physical factor
5 farmers</td><td colspan="2">Farmers who lack knowledge and confidence for development</td></tr>
<tr><td>6 farmers</td><td>Farmers also hindered by some physical factor
4 farmers</td><td>3 farmers</td><td>Farmers also hindered by some physical factor
2 farmers</td></tr>
</table>

7.4 Conclusion

This chapter has discussed the background information to the results of this survey.

It has been seen that farmers in Survey Group B are generally less progressive in attitude and make less use of extension services than farmers in Group A. However 84 percent of Group B farmers are willing to accept advice from extension officers if they call on the farm.

The survey has endorsed the opinions of the local extension workers who feel that the basic need in extension is to increase farmers confidence as to what can be achieved on their farms, and to provide technical knowledge as to how to produce it.

Chapter 8 continues from this chapter and discusses each of the major factors found to be hindering increased production on the survey farms.

CHAPTER 8

SURVEY RESULTS - PART II

8.1 Introduction to Factors Hindering Increased Production

In Chapter 7 it was shown that the major factor hindering increased butterfat production on the farms in Survey Group B was a lack of knowledge and confidence concerning development.[1] The other hindering factors found include: satisfaction with the status quo, old and disabled farmers, sharemilking agreements, labour shortage, fear of flooding, cow ill-thrift problems, unsatisfactory supervised credit arrangements, taxation, milking machine efficiency and decision making.

These problems are each discussed in this chapter and possible solutions suggested.

8.2 Lack of Knowledge and Confidence

On 9 of the 25 farms in Survey Group B the lack of knowledge and confidence was the major factor found to be hindering increased butterfat production, and on another 6 farms it was an important factor. Thus, if any large scale production increases are to be achieved it is of extreme importance to improve the farmer knowledge level.

---

1. Much of this "lack of knowledge" refers to factors associated with questions which the local extension workers are currently mainly concerned, i.e. low stocking rate and low per cow production. However some refers to the availability of extension services, credit, and the productive potential of the land, which are questions receiving less consideration by current extension personnel.

8.2.1 Relationship of knowledge and confidence

The importance of the relationship between knowledge and confidence in the adoption of new practices can be seen from the discussion by Beal and Bohlen on the diffusion process.[2/]

In the early stages of acceptance of new ideas farmers are made aware of the practice generally through mass media. In order for them to proceed with the adoption process, they usually require information directly from people with local experience in the new technique. This may be from extension workers or friends and neighbours, and reflects an increase in knowledge. Confidence is reflected when the farmer accepts the practice as a good idea. Further experience and confidence is gained by personal trial with the new practice. If this proves satisfactory, full adoption then follows.

The author found during this survey that many farmers had made little progress in the adoption process of modern development techniques, and, thus, they still lacked confidence that the ideas were practical. As their knowledge increases and they observe successful adoption amongst neighbouring farmers, their confidence will receive the boost necessary for them to try out, and then fully adopt these practices.

---

2. Beal, G.M., and Bohlen, J.M., Op.cit.

8.2.2 Types of knowledge lacking

8.2.2,1 Lack of knowledge on services available to farmers

8.2.2,11 Extension services

It was shown above that less than half the farmers in Survey Group B have had any direct contact with extension personnel over the last five years.[3/] On many of the farms where there had been no direct contact with extension officers, the farmers were not clearly aware of the information, or type of service that could be obtained. Thus, there is a basic need for farmers to be made aware of the extension services available to them.

The demand for the present extension services could be increased by just publicising the existance of these services. Of course, to the extent that present personnel are fully committed, and working with maximum efficiency at present, new demands for service could only result in less advice to farmers who are currently using and desiring these services.

8.2.2,12 Finance availability

Only 7 farmers in Survey Group B had a clear idea of the present sources of finance and lending policies. Lending institutions operating in this district include the State Advances Corporation, Marginal Lands, insurance companies, savings and trading banks,

---

3. See Section 7.2.2.

and private lenders.[4/] There is a need for disseminating information on the available sources of finance if farmers on the Rangitaiki Plains are to make the maximum use of them.

Even farmers who know finance is available, do not know how to make a good application for credit. Very few Group B farmers have any idea of drawing-up budgets and an outline of the proposed development programme, to present to a lending institution.[5/]

8.2.2,2 Technological knowledge lacking

8.2.2,21 Productive potential of the land

During the survey the author found a wide discrepancy between farmers as to what they thought their land was capable of producing. Table 8.1 shows the maximum production obtained on farms on each soil group in the 1964/65 season and compares this with the figure stated by the most pessimistic farmers as the maximum obtainable potential.

---

4. For an outline of the policies of these institutions in 1966 see: Bradley, H.O., "Rural Finance: State Advances Corporation Policy", Sheepfarming Annual, Massey University, 1966, pp. 161-170, and: Budge, A.A., "A Banker Looks at Sources of Farm Finance", Dairyfarming Annual, Massey University, 1966, pp. 73-85.

5. An example of a sound financial policy was seen on 1 farm in Group A. The farmer presents budgets of intended development whenever a loan is required. Also once a year the bank manager is invited to the farm with the extension officer who is directing the development. This means that the bank manager can see the progress and gain confidence in the farmer, and hence be more likely to be favourable disposed towards him when an extra overdraft is required.

The top producing farmers could see no limit to the potential production.

Table 8.1 Comparison of Maximum and Potential Production as Expressed by Different Farmers

Soil Group	Maximum production 1964/65 season - lb butterfat per acre	"Maximum potential" as stated by most pessimistic farmers - lb butterfat per acre
1	240	180
2	320	240
3	380	300
4	485	350

The lack of knowledge about what similar land is producing is widespread, and applied in some degree to 17 out of the 25 farmers in Group B.

Farmers need to be made aware of what other farmers are producing on the same type of land so that this can act as an encouragement to them to increase production.

8.2.2,22 Development priorities

The recognition of priorities is essential for successful development. During the farm visits the author discussed farm development with each farmer. A comparison of the farmers' development priorities with those of the author showed that only in 9 of the 25 cases was there any agreement.

Farmers frequently mentioned fencing and pasture renewal as first priorities for development. Generally, the author considered increasing stocking rates and later calving as greater priorities. This opinion was formed after consideration of the development on farms in Group A.

The main reason apparent to the author from this survey, for farmers considering fencing and pasture renewal as high priorities in development, was the desire to always have plenty of feed available for their stock. This is a factor which doesn't always coincide with management for high production.

In Section 7.3 the technical knowledge that the local extension officers were aiming at providing was discussed. This was first, to increase stocking rates, and secondly, to increase per cow production. The author feels that this pattern is what is required on all farms where knowledge is lacking.

8.2.2,23 Stocking rate

Table 8.2 gives a comparison within soil groups of stocking rate and production on the farms in Survey Groups A and B. This shows that for all farms in Group B, as well as for the lower producing farms in Group A, there is ample scope for stock and production increases.

Table 8.2 Range of Stock and Production Levels 1965/66 Season

Soil Group	Stocking rate cows/acre		Production lb butterfat per acre	
	Group A	Group B	Group A	Group B
1	0.50	0.38-0.63	139	101-186
2	0.81-1.00	0.38-0.74	256-346	99-239
3	0.90-1.42	0.55-0.90	314-435	183-285
4	1.16-1.37	0.69-1.18	331-477	203-338

8.2.2,24 Cost of increasing stocking rate

Increases in stock numbers may be accomplished by:

(i) Purchasing stock - this is expensive, but gives an immediately productive animal.

(ii) Raising extra young stock - this method is slow, and it reduces the possibilities of production culling. However, the capital outlay is much less.

In the 1965/66 season there were 2,200 cows milked on the 25 farms in Survey Group B, an additional 1200 cows (a 55 per cent increase) would be needed to increase the stocking rates to a reasonable level.[6] This estimate does not allow for compulsory tuberculosis

---

6. A reasonable stocking rate has been arbitrarily defined by the author after reference to Table 8.2, as follows:

Soil Group	Reasonable stocking level cows/acre
1	0.63
2	0.9
3	1.2
4	1.3

testing in 1969.[7]

A total of 1,458 cows are required above the normal replacement rate[8] on the 25 farms in Group B to allow for tuberculosis testing, and increasing stocking rates to reasonable levels.

Farmers in Group B are not rearing these extra stock. Only 8 farmers are rearing a few more calves than are necessary for a normal replacement rate. Thus for the next few years, the availability of replacement stock is likely to put a severe limit on how fast farmers in Group B can expand stock numbers.

Survey Group B represents a random sample of 25 farms from a group of 110 similar farms. For the farms of this type an extra 4,900 cows would be required for large scale development. In the author's estimation approximately 20,000 extra cows (a 30 per cent increase) would be needed to increase stocking rates to reasonable levels (as defined previously) on all farms supplying the Rangitaiki Plains Dairy Company.

---

7. Over the period 1962/65 the average incidence of tuberculosis in the first test in the Whakatane County was 22.4% (Bovine Tuberculosis, Op.cit.) There were 1,150 cows in Group B in the 1965/66 season which had not been tuberculosis tested. Thus, on the basis of the above incidence of tuberculosis, 258 cows will be needed just to maintain existing herds. Subsequent tests will make further demands.

8. A normal replacement rate of 24% would require 258 cows.

In order to get this extra stock it is unreasonable to expect to be able to purchase it from other districts because they also require large increases in stock numbers. Farmers can, thus, expect to have to rear the extra stock within their own district.

If butterfat production is to be significantly increased in this district a large emphasis must be placed on the importance of rearing as many heifer calves as possible. To assist with this there is a need to break down the barrier concerning rearing heifers' calves.

Current extension workers in the district have tried to encourage farmers to rear more heifer calves. The more progressive farmers have taken action in order to overcome the Tuberculosis testing problem and still be able to increase stock numbers. This attitude, however, has not permeated to all farmers.

There is ample scope for farmers who are limited in the number of cows they can milk, but who have access to extra land, to buy in heifer calves and rear them to sell as in-calf heifers. The use of labour saving methods such as rearing 3 or 4 calves on a nurse cow,[9] or dry feeding[10/ 11/ 12/ 13/ 14] calves from about one week old onwards, could be used to reduce the labour input for rearing young stock.

The value of the extra stock required on the farms in Group B is about $\not{}$140,000,[15] and for all suppliers it is about $\not{}$2,000,000.

In order to handle the increased stock numbers, which are essential for significant increases in butterfat production, other complementary inputs will be required.

Most farmers in Group B could make small increases in stock numbers without having to add other inputs. However, for stock numbers to be significantly increased, 15 farmers would have to build a new Herringbone cowshed, and 7 farmers would have to extend an existing shed. There were only 3 farms in Group B with a cowshed able to handle the stock which could easily be carried on the farm.

---

9. "Nurse cows rear Calves in 500-Cow Herd", The New Zealand Farmer, November 18, 1965.
10. Davey, A.W.F., "Principles of Calf Rearing", Dairyfarming Annual, Massey University, 1966, p.22.
11. Barnes, F.R., "270 in one Batch", Dairyfarming Annual, Massey University, 1966, p.30.
12. Easton, J.D., "Calf Rearing Made Easy", Dairyfarming Annual, Massey University, 1966, p.38.
13. Davey, A.W.F., "Feeding Calves on Buttermilk Powder", Dairyfarming Annual, Massey College, 1962, p.23.
14. Campbell, I.L., "The Use of Buttermilk Powder in Calf-Rearing", Dairyfarming Annual, Massey Agricultural College, 1960.
15. This represents 1456 head at $\not{}$96.

It can be seen from the number of new cowsheds required that a large capital outlay is necessary. An expense of $5,000 per farm would be a realistic figure.[16/] This would mean an investment of, say, $75,000 for the 15 farmers requiring new cowsheds.

Thus necessary conditions for rapid and efficient development of Group B farms are the availability of large amounts of financial and real capital, and good information on cowshed designs. The 'real capital' includes a substantial amount of imported piping, stainless steel and other raw materials for milking plants.

In handling extra stock labour is also likely to be a problem.[17/]

The author found that on many farms such items as races, water supply, and subdivision would have to be improved to make effective use of labour.[18/] These items, however, frequently seem to take

---

16. The following prices are actual costs for new milking sheds in the 1966/67 season on the Rangitaiki Plains.
    1. Herringbone, 18-a-side with a circular yard. New N.D.A. machines, built by farmer's labour: $4,800
    2. Herringbone, 18-a-side with new machine. Full contract price: $10,000
    3. Herringbone, 12-a-side with new machines: $ 5,754
    4. Herringbone, 18-a-side with new machines: $ 6,436
    5. Herringbone, 10-a-side full contract price without machines: $ 6,000
17. See Section 8.6.
18. This confirms the ideas expressed by local extension officers for increasing production, see Section 7.3.2,1.

first priority in the farmer's mind. In the author's opinion these factors should only be emphasised after stocking rates are increased. The first priority is to increase stocking rates to the maximum level for the existing fixed inputs, and only then to start improving these so as to be able to further increase stock numbers.

The importance of such items as races, water supply and subdivision grow quickly as stock numbers increase, but the profitability of increasing these inputs without changing stocking levels is usually small.[19/]

When the time comes for adding such items as water reticulation, subdivision, and races, they must be carefully considered and information sought in order to make the most useful and economical job.

8.2.2,25 Per cow production

The survey endorsed the opinion of the local extension officers who consider that the low per cow production is not a result of poor genetic merit, but rather of poor feeding.[20/]

In Survey Group B 16 of the 25 farmers use artificial insemination and thus it may be expected that on these farms the herds are of reasonable genetic merit. The other 9 farmers use bulls which would be of varying genetic merit, including 2 who use pedigree bulls.

---

19. See Case Farm III, Appendix E.3.
20. See Section 7.3.2,2.

A lack of good feeding after calving was evident on many farms in Group B. Most herds calve before the 23rd July and all calve before 7th August. This means that there is little fresh spring growth for at least a month after calving commences.[21/] During this time cows are fed on autumn saved pasture and supplementary feed. There is frequently a drop in the feed quality as the autumn saved pasture is used up prior to the commencement of the spring growth. Farmers in Group A have generally overcome this problem by calving their herds later.

When the author visited farms in Group B in May 1966 he saw paddocks which had been shut since early March. In May there was long rank feed commencing to die at the bottom which the farmers intended to save until July for newly calved cows. As the feed quality was poor in May and little winter growth would be made, it can only be expected that the quality would be worse by July.[22/]

The problem of poor spring feeding was worst in Galatea where farmers generally had poor pasture species such as brown-top,

---

21. According to the leading farmers contacted by the author in this survey the spring growth of ryegrass pastures generally commences in late August on the Rangitaiki Plains. This builds up to a peak in October-November. Poorer paspalum pastures are later in commencing growth. A "ryegrass varieties grazing and mowing trial" experiment number 61/1076, established by the Department of Agriculture, Whakatane, also supported these views. The author is unaware of any available figures on grass growth rate in Galatea. It would be expected however, that the commencement of spring growth would be slightly later than on the Rangitaiki Plains because of the cooler winter climate.

22. This problem is similar to that found by Graham on 1 South Taranaki farm where production was only increasing slowly. Graham, J.V., "The Economics of High Rates of Fertilizer on South Taranaki Dairy Farms", Op.cit., p.F.29.

yarrow, paspalum and yorkshire fog. These species are winter dormant and have to be shut up very early, say March, in order for them to grow. In winter they become frost bitten, a lot of feed is wasted, and quality deteriorates. The author saw on 1 farm in Galatea that this problem need not occur if the pasture species are changed to a ryegrass-white clover type sward. The ryegrass continues to grow over most of the winter and can be shut up in May to provide good spring feed.

Although this problem is worst in Galatea it is still significant on some farms on the Rangitaiki Plains.

Hutton[23/] has shown the importance of good feeding immediately after calving in order to obtain maximum butterfat production in the initial stages of the season. He also showed that the level of production actually achieved in the initial stages has a profound influence on the total lactational output and on the efficiency of conversion of the feed eaten to milk produced.

The importance can be seen of arranging a grazing pattern and calving date in order to be able to fully feed cows with good pasture immediately after calving. Hutton[24/] particularly emphasised the importance of this for farms where stocking rates are approaching 1.5 cows per acre.

---

23. Hutton, J.B., "Feeding Cows well in Early Lactation", Dairy-farming Annual, Massey University, 1966, p.114.

24. Ibid., p.119.

Hewitt[25/] suggested regulating the calving date so that the spring feed should be commencing to make rapid growth by the time the first round of grazing after calving has been completed. He suggested the 1st August as the earliest desirable calving date on the Rangitaiki Plains.

The author generally found that there is an awareness of the ideas of modern pasture management and utilisation amongst the farmers in Group B, although these farmers have not yet proceeded any further in the adoption of these practices.

This basically shows that extension techniques have been successful in making farmers aware of these trends, but that more intensive advice is necessary to help them see the application of these ideas to their own farms.

On 8 farms in Group B drainage will need to be improved before pastures can be significantly improved. The general recommendations for drainage in this district given by the Department of Agriculture, are for shallow open drains. A little mole drainage has also been done on intensively stocked farms in the district.

The application rate of fertilizer will need to be increased on nearly all farms in Group B if production is to be increased to the higher levels of Group A farms. Farmers in Group B need information on the best type of fertilizer for their soil type and the best time of application. Seven farmers are still using straight

---

25. Hewitt, S.R., Department of Agriculture, Whakatane, Pers.comm.

superphosphate, even though potassic superphosphate in split dressings, spring and autumn, has been shown to give a very good response on farms in this district.

Only 42 per cent of farmers in Group A, and 54 per cent in Group B used bulk topdressing in 1966.[26] Farmers' reasons for not using bulk topdressing services amounted to a lack of knowledge.[27] Information should be provided to farmers concerning both the profitability of using bulk topdressing, and the quality of the service available.

Farmers in Galatea generally admitted to the author that they were uncertain about the value and management of lucerne.[28]

It has been stated that feeding is the most important factor affecting per cow production. Feeding is affected by the pasture species and calving date. The pasture species are affected by the stocking rate, fertilizer application rate, and drainage. Thus attention must be given to these items for the raising of per cow production.

---

26. See Appendix C for a cost comparison of using farm spinner and bulk topdressing.
27. See Section 5.2.8.
28. See Section 5.2.2 for recommendations for the successful establishment and management of lucerne.

8.2.3 Improving farmer knowledge level

It has been shown above that there is a considerable lack of knowledge amongst the farmers in Survey Group B. 29/

Improving farmer knowledge level is part of the basic aim of extension. This has been expressed as follows:

> "....the true function of extension should be Rural Education with the object of improving fundamental knowledge, skill, and, where necessary, stimulate the farming community to appreciate and where possible to solve their own problems." 30/

Thus there is a need for extra extension services to the farmers on the Rangitaiki Plains and in Galatea.

When considering improving farmer knowledge level it is important to remember the following points made by Leagans:

> "The process of extension education is one of working with people, not for them; of helping people become self-reliant, not dependent on others; of making people the central actors in the drama, not the stage-hands or spectators. In short, helping people by means of education, put useful knowledge to work for them. 31/

---

29. This supports the ideas of such people as Hudson who claim that there is a large gap between research and the farmer. Hudson, A.W., "The Farm Improvement Club Movement and the Place of the General Adviser in Agriculture", New Zealand Institute of Agricultural Science, 1955, pp 52-57.

30. Report by No.6 Committee on Workshop No.1., N.Z.I.A.S. Massey College Extension Workshop, 1961, p.19.

31. Leagans, J.P., "Some Principles and Concepts of Extension Programme Development", Cornell University, Ithaca.

8.2.3,1 Types of extension media and information to supply

In the following section the extension media best suited to farmers in Survey Group B are discussed.

Various workers including Beal and Bohlen,[32] Rodgers and Beal,[33] Copp, Sill and Brown,[34] Mason,[35] and Presser and Russell,[36] have shown that mass media, group media and individual contact have different parts to play in the adoption of new practices.

Mass media is generally most effective at the awareness and interest stages of new ideas.

Group media is of greatest importance in the evaluation and trial stages of adoption, and individual contact plays its greatest part in the trial and adoption stages.

8.2.3,11 Mass media

Section 7.2.2 gave an outline of the farmers' use of mass media. The media receiving attention by about 50 per cent of the farmers in both Survey Groups A and B are the Dairy Factory

---

32. Beal, G.M., and Bohlen, J.M., Op.cit.
33. Rodgers, E.M., and Beal, G.M., "The Importance of Personal Influence in the Adoption of Technological Changes", Social Forces, 36, 1958, pp 329-335.
34. Copp, J.H., Sill, M.L., and Brown, E.J., "The Function of Information Sources in the Farm Practice Adoption Process", Rural Sociology, 23, 1958, pp 145-157.
35. Mason, R.G., "The Use of Information Sources in the Process of Adoption", Rural Sociology, 29, 1964, pp 40-52.
36. Presser, H.A., and Russell, H.M., "Acceptance of Research Results by Farmers", Review of Marketing and Agricultural Economics, 33, 3, 1965, pp 147-165.

Newsletter, local farmer conferences, and success stories or general farming articles in farming journals or local newspapers. Radio broadcasts are not playing a very significant part in extension amongst the farmers contacted in this survey. The existing radio programmes are at unsuitable times, and the radio is turned off at nights in preference to television.

The author concluded from this survey that there is little value in continuing the present local radio farming programmes, at least in their present form.

The farmers' attitude towards television suggest that this is potentially a very useful extension media.[37/] Television, although a more costly extension form that most other mass media, has a very wide audience. In using television as an extension media it would be essential to have programme times which are suitable to farmers, say between 7.30 and 9.00 p.m.[38/]

---

37. The use of this media has been discussed by: McCannon, N.R., "Making the most of Television Time", Department of Agricultural Journalism, University of Wisconsin, Bulletin 20, November 1956.

38. The current single channel situation in New Zealand probably forces the director of "Country Calendar" to strive for a more 'general' appeal than would be really suitable for a programme with a primary extension function. The author considers, however, that short intensive extension programmes are a feasible possibility under the present situation and that they could have a high extension value.
Such programmes could not be done specifically for the Rangitaiki Plains but would have to be integrated within a pattern suitable for all farmers within the Auckland television network.

The author would suggest that the most useful mass media to use for extension in this district are the Dairy Factory Newsletter, local farmer conferences, newspaper articles and television.

The use of special printed bulletins is also likely to be useful.

In using mass media it is important to remember the following comment by Read:

> "The effectiveness of mass media is directly related to the extension workers' confidence in the media and his skill in using the techniques required by the media. 39/

Mass media, which should create awareness and interest, could be used to provide information to the farmers visited in this survey on the following subjects:

(i) The availability and type of service provided by extension officers. The value of discussion groups should be emphasised and information supplied on the establishment of groups. This would be designed to stimulate farmers into joining a group and approaching an extension officer to advise them. The availability of individual service from extension officers (including free advice from Department of Agriculture and Dairy Board officers, and paid advice from Private Consultants and Farm Improvement Club Advisors) should also be advertised.

---

39. Read, H., "The Effective Role of Mass Media in Agricultural Extension Education", Australian Agricultural Extension Conference 1962, Reviews, Papers, and Reports, Commonwealth Scientific and Industrial Research Organization, Melbourne, 1963, p.255.

(ii) The current availability of finance and terms of lending. Although there is never a shortage of people wishing to borrow, many highly profitable development projects are not being carried out because of a lack of capital. The author found many farmers unwilling to approach a lending institution because they thought the institution's policy was the same as ten years ago.

(iii) Cowshed design.

(iv) Lucerne growth and management. This information was needed by all survey farmers who grew this plant.

(v) Pasture renewal and later calving. All farmers had reached the awareness stage for these items, but more mass media could be used to exhort farmers to progress further with these ideas.

(vi) Increasing stocking rates and encouraging farmers to rear more heifer calves as well as making them aware of the effects of compulsory Tuberculosis testing. On most farms in Group A this item had been seriously considered and farmers were either in, or near, the adoption stage. In Group B however, only 8 farmers were near the adoption stage and 7 farmers were only vaguely approaching the awareness stage. The remaining 10 farmers were in between these two extremes.

(vii) Development priorities. For at least half the farmers in Group B an understanding of priorities in development had not reached the awareness and interest stages. Farmers recognised that they only wanted to do things which were profitable and congenial. They frequently did not, however, follow the most profitable and congenial path because of a misunderstanding of priorities. Mass media can stress how to select priorities and the need to make sure they are followed, in the best order. The first priorities in development will differ on different farms. The farmer can only be properly advised after direct contact by the extension worker, with the individual situation. As a general rule however, for farmers in Group B increasing stocking rates is the most important item.

8.2.3,12 Group media

Section 7.2.2,4 has shown that the farmers in Survey Group B are very interested in discussion groups amongst their friends.[40] This suggests that this means of extension has a great potential amongst farmers who are not receiving much extension advice from other sources, provided the members of the group are interested in development. It was observed however, that farmers who were able to get regular individual assistance preferred this to discussion groups.

If extra extension personnel become available some of these resources should be utilized in encouraging farmers to form discussion groups, and then in servicing these groups.

Discussion groups could be used to help bring closer to adoption all the items suggested under mass media. In addition, they could emphasize:

(i) The development of the use of sound borrowing principles;

(ii) The education of farmers in the decision-making process;

(iii) The widening of farmer's knowledge of the productive potential of their land;

(iv) The type, rate, time and method of application of fertilizer.

---

40. The author found in this survey that 'friends' were generally other farmers at a similar level of production and with a similar outlook to farming. Neighbours were not necessarily classified as 'friends'. The author found that there was generally a lack of communication between progressive and static farmers.

8.2.3,13 Individual contact

In Table 7.1 it was seen that 84 per cent of farmers in Survey Group B are willing to use an extension officer if he arrives on the farm. In Table 7.3 however, it was seen that only 46 per cent of the farmers in Group B are keen to join a discussion group. Thus, although discussion groups have a large potential for extension work, they will not be able to reach all farmers who are willing to accept advice.

The success of discussion groups will largely depend on initially activating a few farmers in the group by individual contact.

The author believes that in addition to the accelerated use of mass and group media more individual contact extension services need to be provided in this district.

Individual contacts with an extension officer can have an important role in:

(i) Providing factual information previously unavailable to the farmers;

(ii) Bringing to adoption stage an idea which has progressed, in the farmer's mind, through the previous stages of the adoption process;[41]

---

41. Beal, G.M., and Bohlen, J.M., Op.cit.

(iii) Inspiring the farmer with the confidence to undertake a programme by integrating previously known information into an evidently profitable and feasible programme.42/

Individual contacts should provide the same information as recommended above for group media.

8.2.3,2 Providing extra extension services

The existing extension officers in this district are already fully employed helping and encouraging the more progressive farmers to adopt new practices. In order to increase production on the farms visited in this survey, more extension officers will be required in this district.

Extension services are provided to farmers by government, industry and private resources.43/

Government and industry extension officers are not directly dependent on their clients for their income and thus are able to use whatever means of extension they think will have the largest effect on district production. If they think it desirable they can spend all their time on mass media.

---

42. See Section 8.2.4.

43. The existing services to suppliers to the Rangitaiki Plains Dairy Company were discussed in Section 2.8.

Private sources such as Farm Improvement Club Advisors and Private Consultants are limited in the range of services they can provide because they are directly dependent for a living on paying clients. They are thus, primarily limited to individual contacts, or to groups which may form and pay for their services. They are only able to spend a limited amount of time on mass media because it gives little direct cash return, and is an inefficient method of increasing the productivity of their particular clients. The use of some mass media may however be necessary for building up their reputation.

For political reasons government and industry resources, must be spread relatively evenly throughout the country. Thus because of the limited number of extension workers available to both the Department of Agriculture and the Dairy Board it would be unreasonable to expect these sources to provide the extra extension services required for full development of the Rangitaiki Plains and Galatea districts.

Private sources are not restricted by political factors. Where a high financial return can be expected from extra extension services, private individuals or groups who will receive the benefit from such returns, can afford to pay a high salary which will be sufficiently competitive to attract extra extension officers.

The extra extension services required in this district would only be likely to accomplish their purpose of reaching the non-adopting farmers if, in the first place at least, they are provided free.

Farmers who have not learnt the value of extension services would be hesitant to pay an extension officer to visit their farm. This means that the extra extension services could not be satisfactorily provided on a Farm Improvement Club or Private Consultant basis where payment is made for each visit.

The obvious group to back a private, free advisory service is the Dairy Company. The extra production and turn-over at the Dairy Factory would tend to offset the salary of an extension officer, and even if the manufacturing economies did not fully meet the cost of the extension service the fact that suppliers had higher net incomes, would correspond to the co-operative spirit of running the factory so as to maximize the incomes of suppliers.

8.2.4 Improving farmers' confidence

In discussing the function of a farm management adviser Schapper states:

> "All that the farm management advisor does, and that is a big task, is to help the farmer clarify his goals, to select the best means, and to make better decisions than he would otherwise. Even though some of the decisions may be the same as those without the adviser, it is hypothesised that the farm management adviser is able to inspire the farmer - the decision-maker - with confidence. In other words the adviser can reduce uncertainty. Even though some decisions may be exactly the same, this reduction of uncertainty of itself is a worthwhile function. Perhaps it will not be reflected in higher net returns, but it will

certainly be reflected in peace of mind."[44]

This definition of the function of an extension officer shows the importance he has in inspiring confidence within the farmers he contacts. The boosting of confidence is the main advantage of being a member of the Farm Improvement Club according to 3 of the 9 survey farmers who were members of the Club.

During this survey the author was able to discuss and budget with the farmer possible development programmes on several farms. In at least 2 cases this day spent with the farmer discussing his farm and its production potential precipitated an immediate large scale development programme.

Case Farm I in Chapter 6 was one of these farms. The farmer had the technical knowledge for large scale development but lacked sufficient confidence. This was gained by talking with the author who drew up budgets to show the profitability of the proposed programme and suggested a few technical modifications. The farmer having initiated the development following a visit by the author proceeded with the programme himself. He had previously gained information concerning development from past experience, farming journals, Ruakura field days and discussion groups, as well as some individual contact with extension workers. All that was needed to

---

44. Schapper, H.P., "Farm Management Clubs", Australian Agricultural Extension Conference 1962, Reviews, Papers, and Reports, Commonwealth Scientific and Industrial Research Organization, Melbourne, 1963, p.168.

set a large scale development programme going was the encouragement from an extension worker to boost the farmer's confidence, and to show on paper, using the farmer's figures, the profitability of the proposed programme.

In the second case, the farmer had thought a little about development, having been prompted by circumstances, and mass media such as farming journals, as well as talking with neighbours and seeing their success. This farmer however, was lacking both technical knowledge and confidence. The author was able to draw up a development programme along the lines the farmer had been thinking, with budgets to show the profitability of development, and suggest specific sources of specialised technical advice. This farmer also proceeded with a crash development programme following one visit by the author. Previous to this, the farmer had been deliberating for years but had not made the effort to invite an extension worker onto the farm. This farmer has since commenced making use of a regular direct extension service.

Extension workers can build up farmers' confidence in development by providing sound information on the success of development on other farms, and by helping the farmer to understand and learn more about development practices.[45] Words of encouragement also often tend to inspire confidence.

---

45. See Section 8.2.3,13 for the uses of individual contact for extension purposes.

8.2.5 Conclusion on lack of knowledge and confidence

It has been shown above that a lack of knowledge and confidence is the major factor hindering increased production on farms in Survey Group B. To overcome this problem it has been seen that extra extension services including mass media, group media and individual contact services are required, and that these can best be supplied by the local Dairy Factory providing an advisory service.

8.3 Satisfaction with the Status Quo

There are 5 farmers (20 per cent of the sample) who are satisfied with the status quo. These can, however, be divided into two categories.

8.3.1 Farmers personally satisfied and disinterested in progress

There are 2 farmers who are satisfied with the existence they are making and are completely disinterested in finding out what is going on around them. Both these farmers are over 45 years of age. Their ambition is to keep themselves out of debt and do as little work as possible. One farmer recently increased production a little because he is sending two children to boarding school and needed higher personal drawings.

The author considers that the time and effort which would be required to motivate these farmers into action would be unprofitable in terms of extension workers time.[46]

8.3.2 Farmers interested in progress, but too sceptical to adopt new technology

There are 3 farmers in this category who are mentally alert and interested in what is going on in the progressive farming world. They are, however, extremely sceptical about high production and high stocking rates, and are personally convinced that the farmers doing these things must soon suffer a setback. These farmers read farming journals and go to farming conferences in order to keep up to date. They are not, however, so willing to have direct contact with extension officers on their farms. In their present frame of mind, these men would be very hesitant to accept advice from an extension officer who happened to call on their farm.

Due to their present scepticism about adopting current development techniques, the author considers that time spent by extension officers trying to motivate these farmers by direct individual contact now, would be uneconomical compared with what could be done on other farms. When it has been shown in the mass media that development is successful over many years these farmers must be affected. The ideas will insidiously become part of their way of thinking. They will then be ready for more intensive advice in order to help

---

46. In any case whilst one can easily argue that outside agencies should help farmers achieve their own goals, it is quite another thing to argue that these agencies should try to change farmers goals.

them implement these ideas on their own farms.

8.4 Old and Disabled Farmers

8.4.1 The problem

On 4 farms in Survey Group B the farmers' health was poor. All of these farmers were about fifty years of age and 2 of them still had dependent children. The deterioration in farmers' health meant that the effective labour input on these farms was reduced, and there was a consequent labour shortage.

Anderson and Eichhorn have shown that although older farmers in poor health are handicapped in making efficient use of their labour some are still efficient.[47]

On 2 of these 4 farms the farmer would be capable of managing the property for some years to come, but he could not do the physical work required to increase butterfat production. In order to increase production on these farms labour would have to be employed. Neither of these farmers are willing to employ outside single labour because of the disadvantages associated with it. The employment of married labour would require expenditure to build a house.

One of the farms concerned here is only a small property of 70 acres and the owner considers that it would be over-capitalising the property to build another house.

---

47. Anderson, R.M., and Eichhorn, R.L., "Correlates of Labour Efficiency Amongst Older Farmers in Poor Health", Rural Sociology, 29, 2, 1964, pp.181-193.

This farm (Number 16) is on Soil Group 3 and in 1965/66 was producing 260 lb butterfat per acre.[48] The author considers that 360 lb butterfat per acre would be a realistic figure to expect on this farm under the present management. This would involve a total increase in butterfat production of 7,000 lb, which if the per cow production remained constant at 280 lb butterfat per cow, would require an extra 25 cows thus making the stocking rate 1.25 cows per acre.

Appendix F.1 gives an outline of development proposed by the author for this farm, which would include employing a youth and milking an extra 25 cows. It has been shown that this would be profitable to the farmer, returning an added annual post tax cash profit of $447.8, after a 4 year payback period.

A younger fitter man would be able to manage this farm on his own at the proposed level of production.

Since the survey this farmer has sold the property.[49] The farmer's inability to do much physical work over recent years led him to take up extra educational pursuits off the farm. He sold the property with the intention of pursuing his education further in fields where his physical disability will not hinder him.

---

48. The maximum production obtained in the 1964/65 season on Soil Group 3 was 390 lb butterfat per acre.

49. No causal relationship is inferred from this sequence of events.

On the other farm (Number 18) where the farmer is capable of managing the property, but not of doing the physical work required to increase production, a son is being employed on a 29 per cent sharemilking basis. The son does not want to spend all his time on the farm. This farm is in Galatea and even if outside single labour was wanted, it would be hard to obtain, and retain, because of the isolated situation. This farm is of adequate size to support another married man.

Appendix F.2 outlines the author's proposed development for this farm which would include building another house and employing a married man, milking 50 extra cows, applying extra fertilizer, and enlarging the cowshed. Calving would be put back from 15th July to 1st August.

This development would not be profitable to the son on a 29 per cent sharemilking agreement. If the farmer however, operated the farm on an owner operator basis and paid his son the same income as at present the programme would be profitable.

In this later case the added annual post tax cash profit would increase by $1,153.2, after a 9 year payback period.

Proceeding with this development, which is similar to that on Case Farm I in Chapter 6, would mean that the owner would not have to work as hard as at present, yet he would still have the interest of managing the farm.

This farmer had not carefully considered the profitability of employing labour, nor the personal benefit to himself in social or medical terms. In the author's opinion suggestions along these lines should be made to this sort of farmer by extension workers, and the profitability and congeniality of the proposed development clearly presented. The farmer must make the final decision, but until the alternatives have been clearly portrayed he cannot make a sound decision. An extension officer by formulating the problem and the alternatives can place the farmer in a much improved position to make a decision. Even talking with an extension officer might help the farmer face the real decisions he needs to make, where without this outside interest, the problem might remain for several years at an unconscious level.

On the other 2 farms where the farmers' old age and ill health were the major factors hindering increased production, the farmer was no longer capable of either the physical work or the managerial effort required to increase production.

One of these farmers has now sold out, and the other is retaining the farm in the hope that his son will want to run it.

Appendix F.3 shows a partial budget for the profitability of increasing production to a reasonable level on the farm being retained. The farm (Number 22) is in Galatea and the proposed development would double butterfat production from 21,000 to 42,000 lb. After a 6 year payback period this development would return an added annual post tax cash profit of $2,456.8.[50/]

8.4.2 National cost of allowing low levels of production

The above proposed development on farm Number 22 shows that there is a direct cost to the nation (from reduced taxes) of $2,413 per annum in not developing this farm. This can also be expressed as the opportunity cost from export earnings on 21,000 lb butterfat.

Appendix F.6 summarizes the profitability of the proposed development on 5 survey farms. It is shown that taxation takes an average of 52.5 per cent of the present value of added cash profits from the proposed development on these 5 farms. This represents a total annual income to the nation of $6,241.4, which is not made if development does not proceed.

The export earnings on the 70,000 lb extra butterfat that development of the 5 farms would produce would amount to about $25,000 per annum.[51/]

Thus, using either of the above measures, there is a high cost to the nation in allowing low production to continue.

It is an interesting facet of national agricultural policy that where increased production is hindered by old disabled farmers it may be worthwhile making a substantial payment (direct or indirect)

---

50. Taxation also increases by $2,413.

51. This was calculated using the same return for butterfat ($0.3596) as has been used throughout this study.

to get these farmers off their properties, and to let younger, more progressive men take over.

Recommending that farmers move off their land poses a number of problems, which include:

(i) Suitable incentives to get the farmer off the property;

(ii) Suitable arrangements for housing facilities in town for displaced farmers; and

(iii) Superannuation scheme.

Before sound practical incentives could be recommended for encouraging old, less productive farmers off their properties a full study of their situation and attitudes would be required. For this a larger sample of farmers in this category would be needed than occurred in the present survey.

8.5 Sharemilking Agreements

Table 8.3 sets out the number of farms in Survey Group B run on a sharemilking basis and the type of agreement.

Table 8.3 Sharemilking Agreements

Type of Agreement	Family situation	Non-family situation
29%	1 farm	Nil
39%	Nil	1 farm
50%	1 farm	2 farms

Two other farms (Numbers 24 and 32) were run on a 50 per cent sharemilking agreement until shortly prior to the author's visit. These were both family arrangements where the owners sons had recently purchased the farms. In both cases production had been hindered primarily because of conflicting aims arising within the sharemilking agreement. On farm Number 32 the son did not want the purchase price of the property to be inflated by improvement. On farm Number 24 the father wanted all the money possible to use for another purpose and so nothing was put back into the farm.

Once these agreements were terminated the new owners looked forward to making large increases in production.

On the farms being run by sharemilkers at the time of this survey the share-agreement was the most limiting factor to increased production on 1 farm (Number 26). This farm is situated in the Whakatane river valley, and is run by a 39 per cent non-family sharemilker.

A Herringbone cowshed on this farm would enable the sharemilker to handle extra cows, however as the existing 4-doubled-up internal race shed is only five years old the owner is unwilling to build a new shed for some years.[52]

---

52. This is a good illustration of the conflict situation which can arise in sharefarming agreements. If production is to be increased on this farm the owner feels that the sharemilker should add labour whereas the sharefarmer considers that the owner should add capital.
 For further details on the innate tendency to inefficiency in the present sharemilking agreements see: Sargent, E.D., "Some Problems Arising from Present Sharefarming Agreements", Op.cit.

Appendix F.4 evaluates the profitability of employing a youth and milking an extra 35 cows on this farm. If the farm were owner operated this would be profitable and would return an added annual post tax cash profit of $1,316.4, after a 2 year payback period. In the sharefarming situation the development would be unprofitable to the sharemilker.

In Section 8.4 it was seen that farm Number 18, which is being run on a 29 per cent sharemilking basis, could not be developed profitably by the sharemilker. A profitable alternative for the successful operation of this farm was suggested to enable full development.

The share-agreement was not the most limiting factor to increased production on the remaining share-farms but it was still a limiting factor.

It can be seen from the above examples that a change is required in the present sharefarming agreements before owners and sharefarmers alike can profitably develop their farms.[53/]

53. Such a change has been proposed by: Candler, W.V., "A New Look at Sharefarming Agreements", Dairyfarming Annual, Massey University of Manawatu, 1965, pp.41-45.

8.6 Labour Shortage

8.6.1 The problem

On 1 farm in this survey where the farmer is capable of good physical work and has the managerial ability to increase butterfat production, increases are being hindered primarily by a labour shortage.

This farm (Number 19) is situated in Galatea, where, due to isolation it would be difficult to hold single labour. Prior to the survey the farmer had not seriously considered employing married labour. At present he is rearing extra calves to sell as in-calf heifers in order to utilize some of the surplus feed.

Appendix F.5 outlines the current situation on this farm and presents a proposed profitable development programme which includes adding 55 cows, a married labour unit, and building another house. After a 7 year payback period the annual post tax cash profit would be increased by $1,686, and the farmer's wife would not have to work as hard as at present.

8.6.2 Demand and availability of farm labour

Most farmers in Survey Group B will eventually come to a labour shortage if butterfat production is substantially increased. In most cases, however, production could still increase considerably with the existing labour force, provided that other labour-saving devices are employed, such as replacing an old walk-through milking shed with a well designed Herringbone shed.

Farmers in Group A who have recently been rapidly increasing production have had to employ extra labour and as more farmers in the district start increasing production by significant amounts more farm labour will be required.

In considering the farm labour situation it is a fallacy to think only of the situation on an individual farm. The district situation must be considered and the labour requirements must be met for the district as well as for the individual farm.

The potential for increased production on the 25 farms in Group B is 640,000 lb butterfat (or 100 per cent) above their present level of production.[54]

At this rate the potential for increased production on the farms of Group B type (one sixth of suppliers to the Rangitaiki Plains Dairy Company) would be about 2,700,000 lb butterfat.

The author would estimate that the total current potential for increased production amongst the suppliers to the Rangitaiki Plains Dairy Company would be approximately 11,000,000 lb butterfat (or 55 per cent increase) above the 1965/66 seasons production.[55]

---

54. Potential production has been taken as the maximum production within soil groups in the 1964/65 season.

55. The author is not implying that this is the maximum production ever likely to be attained by the suppliers to the Rangitaiki Plains Dairy Company, but rather the production that would be attained if all farmers were producing near the current top levels of production.

On a district basis, to produce the above estimated potential production about 350 extra farm labourers would be required.[56]

If the rate of farm development is rapidly accelerated a major labour shortage may occur. In this case it would be necessary to consider ways of improving the supply of trained reliable farm labour on the Rangitaiki Plains and in Galatea. If this need arises the author would recommend that a survey be done specifically studying farm labour and investigating ways of increasing the supply of good reliable labour in the district.

8.7 Flooding

There are 6 farms in Survey Group B situated in such a position that severe local floods cover a substantial area of the farm. Each farmer in this category said that flooding was limiting his production. This was true to a certain extent, in that production was reduced from what it could have been when a flood damaged a lot of pasture in the autumn. This also had a carry-over effect, in some cases, into the following spring if there was bad pasture damage.

Only in 1 of these cases is the fear of flooding the most important factor hindering an increase in butterfat production. On 5 of the farms where the farmer stated that flooding was the main reason hindering increased production, the author found other more

---

56. This assumes that no other major steps are made in technology enabling the number of cows milked per man to be significantly increased above present levels.

limiting factors which included, old age and ill health (1 farm), sharefarming agreement (1 farm), satisfaction with the status quo (1 farm), and a lack of technical knowledge and confidence (2 farms).

On the 1 farm (Number 23) where the flooding fear is the major limiting factor it is reflected in the sharemilking agreement.[57] The owner is hesitant about applying much fertilizer or investing large sums of capital until the flooding danger is removed. The sharemilker is also fearful of the possible consequences of flooding as this farm has been badly flooded.

The floods on the Rangitaiki Plains have generally occurred in late summer or autumn - hence primarily affecting the latter part of the dairy season.

In the author's opinion the fear of flooding is not a valid reason for low stocking rates. The farms which are floodable are all on good river silts and capable of very high production. In Section 2.5 it was shown that stock losses have been very low in each of the floods on the Rangitaiki Plains. Hence it can be safely argued that the value of stock losses irrespective of whether farmers have a high or low stocking rate would remain low. If the farmer has some high land, then stock can be safely put on these areas in the case of a flood. It would not matter if part or all of the herd had to be dried off in the early autumn as high production would have been gained over the spring and summer and the farmer could well afford a holiday for the

---

57. Even if this farm were owner operated production would not be increased because of the fear of flooding.

rest of the season if need be.[58/]

8.8 Cow Ill-thrift

Cow-ill thrift[59/] is the major factor hindering increased production on 1 farm in Survey Group B. Each year since 1962 production has been considerably less than would be reasonably expected. Labour has changed over this time without affecting production. Trace elements, cobalt, copper, and selenium have all been tried without lasting effect. The stock have also been changed - a complete herd which was producing well on another farm was brought onto this property and the same poor results were obtained. The milking plant has been tested for voltage and pulsations. A small voltage was corrected without effecting production. There has also been a major problem rearing healthy calves.

Stock numbers were increased by 25 per cent over the years 1962/65, but as this problem had not been remedied, in spite of much effort, the owner considered that it was not worthwhile trying to

---

58. This same argument has been put forward by Ashworth in the case of summer droughts where he says:
    "Old Joe, over the fence, kept telling us to wait for the drought. And while he wastes away the years preparing for the dry season, or the wet winter, we will have cashed in sufficiently in all the other seasons to be almost able to afford to take the year off and let the drought or flood go by."
    Ashworth, V., "Dairy Farmers Calendar", The New Zealand Farmer, February 24, 1966.

59. This problem was discussed in Section 5.3.7. The cows fall off rapidly in production during the spring and their coats become very dull. These animals have generally gone dry by late summer. Once they stop milking they pick up body condition rapidly.

increase stock numbers any further. In the 1965/66 season 22 acres of maize were grown as a means of utilising the land more profitably.

The ill-thrift problem has generally been associated with farms where stock numbers have been rapidly increased in one year, even though the stocking rate may not be at a particularly high level.

The problem of ill-thrift needs careful research. So far there has been an investigation,[60/] but the results were not conclusive enough to be able to trace the main fault. On some farms this problem has appeared in one year and gone the next. On the farm mentioned above the problem has been present for five consecutive years.

This problem constitutes one legitimate argument against increasing stocking rates. Farmers who do go ahead in spite of this problem take a risk, which is statistically small at present, but is serious for those who happen to become involved.

This problem deserves the attention of trained research workers.

---

60. This investigation was done in May 1966 by the local Department of Agriculture Farm Advisory Officers and the Livestock Instructor as a study of 4 affected, and 4 similar unaffected farms. The results were inconclusive but suggested that only on 1 farm was there a real ill-thrift problem which it was suggested may have been due to "soft" feed, trace element deficiencies, feed shortage after calving, shed technique, or water supply and drainage. It was considered that on the other 3 affected farms the problem was largely the result of weak management.

8.9 Unsatisfactory Supervised Credit Arrangements

There is 1 farmer in Survey Group B who purchased his farm under a Maori Affairs Department Settlement Plan, and who is still being supervised by the Maori Affairs Department Advisory Officers.

The production on this farm in 1965/66 was 110 lb butterfat per acre, and 194 lb butterfat per cow. The maximum production obtained on the same soil type in the 1964/65 season was 320 lb butterfat per acre, thus showing a large untapped potential on the farm.

This farmer has lost a lot of the inclination for hard work because irrespective of the work done, he only receives a basic income of $900 per year. He could increase production if more improved technical knowledge were incorporated into the management decisions made for him, and if there was more immediate financial incentive.

8.10 Taxation

Only 2 farmers stated that taxation was a factor hindering them from increasing butterfat production. In 1 case the farmer stated later that labour shortage was the major problem on his farm, and that if he had sufficient labour he would increase butterfat production.[61/]

---

61. It is shown in Appendix F.5 that employing labour on this farm (Number 19) would be highly profitable.

In the other case the wife was working off the farm, and the farmer was getting no taxation exemption for her or for the family. During the interview the writer formed the opinion that taxation was only a side issue and production would have increased on this property if the farmer's health had been good and he was physically capable of doing the work required. The taxation argument in this case only came up when it was suggested by the author that employing labour might be profitable. This situation had not been carefully budgeted in the post-tax situation by the farmer, and as such he had no sound basis for saying that taxation would make it unprofitable.

In this survey taxation was not found to be a major factor hindering increased production at present, however it is starting to influence the decisions of the developing farmers, and must act as a disincentive to increasing production.[62/]

The significance of taxation as a disincentive to development can be seen in Table 8.4 where the percentage of the present value of added cash profits taken by tax is shown for the actual development programmes,[63/] and the proposed development programmes.[64/]

---

62. This impression concerning the effect of taxation is similar to that gained by Wright while studying the development of unploughable hill country.
Wright, A., "The Development of Unploughable Hill Country", Op.cit., p.89.

63. See Appendix E.

64. See Appendix F.

Table 8.4 Effect of Taxation on Development Profits

Farm	Percentage of present value of added cash profits taken by tax
Actual Development	
Case Farm I	48.8
Case Farm II	48.1
Case Farm III	-39.3
Case Farm IV	56.6
Case Farm V	35.3
Proposed Development	
Number 16	42.4
Number 18	57.1
Number 22	56.7
Number 26	50.9
Number 19	53.7

The author found in this survey that farmers in Group A generally make much better use of their accountants to reduce taxation than farmers in Group B.

8.11 Milking Machines

During the survey the author asked the local Farm Dairy Instructors to check the milking machines on 18 Group B farms.[65] Of these only 11 were checked. Seven of the farms on which the

65. See Section 4.4.4 for the reasons for only asking for 18 milking plants to be checked.

author wanted the milking plants checked were not done because:

(i) A satisfactory time could not be arranged with the farmer, (4 farms).

(ii) The plant was in too poor or insanitary condition, (2 farms).

(iii) The farmer was building a new milking shed, (1 farm).

Table 8.5 shows the results of the milking machine checks.

Table 8.5 Results of Milking Machine Checks

Survey Farm Number	Machine consumption	Air reserve	Relief valves require servicing	Pulsators require servicing
15	N	H	Yes	Yes
16	H	H	No	No
18	H	L	No	Yes
19	H	N	Yes	No
20	H	N	No	No
21	N	L	Yes	No
22	H	L	No	Yes
26	H	N	Yes	No
28	H	N	No	No
29	L	H	Yes	Yes
31	N	L	No	No

N = Normal L = Low H = High

The main reason for the machine consumption being high on 7 farms was perished rubberware. This reflected the fact that new rubberware had not yet been installed for the coming season.

The results in Table 8.5 suggest that on 60 per cent of farms adjustment to the milking plant would improve the efficiency of milking and the comfort to the cow.

Whittlestone has said that:

> "A study of the relationships between machines and mastitis suggests that any factor which increases the time the cups are on the cows tends to cause a rise in cell count, a sign that irritation and possible damage is involved." 66/

The author does not consider that on any farm visited in this survey the milking plant and technique was the major factor hindering increased butterfat production. He would expect, however, that production could be improved by correct adjustment of the milking plant on some farms. Considerable improvement should be possible on the 2 farms where the plant was in a too poor or insanitary condition to be checked by the Farm Dairy Instructors.

---

66. Whittlestone, W.G., "Milking Sheds and Plants of the Future", Dairyfarming Annual, Massey University, 1966, pp.151-159.

8.12 Decision Making

8.12.1 The need to formalise decision making

An overall pattern has emerged with nearly all these factors hindering increased butterfat production showing the need for the development of a proper thinking pattern amongst farmers.

Routhe emphasized the importance of the decision making process in extension work when he stated that:

> "Decision making is the heart of a farm management education programme and should be the focal point of our educational efforts. The central educational objective should be to help rural people to improve their ability to make decisions that achieve goals with the most efficient expenditure of resources. Decision making is a conscious reasoning process that should involve six steps of goal formulation, problem definition, alternative analysis, decision, decision implementation, and evaluation."67/

It became apparent to the author that the farmers in Survey Group B are not making sound decisions because they are not following a sound thinking pattern. This emphasises a basic need for educating farmers as to how to think and make decisions.

A farmers decision to adopt a new practice may be affected by many social as well as economic factors. The author is confident, however, that farmers could make much better decisions than at present, if they could clearly set out problems and evaluate the alternative solutions.

---

67. Routhe, H.G., "The Application of Decision Making Processes in Extension Work in Farm Management", Journal of Farm Economics, 44, 5, 1962, p.1506.

In this survey the author found that some farmers tend to refrain from adopting an economical practice because of personal attitudes which are based on unsound knowledge.[68/] If all the pros and cons are carefully set out the practice may well be adopted instead of being put aside. If the farmer is unable to clearly perform this job himself, as frequently is the case, then an extension worker should be used to present the alternatives clearly to the farmer so that he can make a rational decision. Prejudices may also disappear when the farmer has to explicity state and justify his course of action.

8.12.2 Improving farmers decision making progress

Some of the local extension officers have a very definite aim of improving the farmers' decision making process while advising them. This is done by helping the farmer first to recognise his problems, and then drawing him out in conversation to discover the possible alternatives for overcoming them. The extension worker then clearly summarises the situation and leaves the farmer to make his own decision which is based on a clearer understanding of the whole situation.

---

68. An example of this was seen on a number of farms where the farmers were hesitant to use bulk topdressing services. They preferred to use a spinner topdresser because of the convenience of being able to apply small lots of fertilizer at any time. If the farmers were fully aware of the service available and the saving involved in using bulk topdressing services (see Appendix C) the author is confident that many more farmers would use this service.

The training of farmers to make decisions is a very important (and time consuming) part of an extension officer's job. This, according to Campbell,[69/] and Leagans,[70/] is more important in the long run than just providing information about a particular problem as it aims at making farmers independent of the extension worker.

The results of this survey have shown that there is a need for extension workers to make a specific aim of educating the Group B type farmers in the decision making process.

8.13 Conclusion

This very long chapter has discussed each of the major factors found to be hindering increased production on the farms in Survey Group B. These factors are as follows:

(i) Lack of knowledge and confidence, (9 farms).

The knowledge lacking included information on both services available to farmers and development technology. As a consequence of the lack of knowledge, confidence was also lacking. The methods and cost of increasing production have been considered, and the various extension media discussed in relation to meeting the needs of Group B farmers. It has been seen that extra

---

69. Campbell, K.O., "Farm Decision Making and its Implications for Agricultural Extension", Australian Agricultural Extension Conference 1962, Reviews, Papers, and Reports, Commonwealth Scientific and Industrial Research Organization, Melbourne, 1963, p.299.

70. Leagans, J.P., Op.cit.

extension services are required in the district.

(ii) Satisfaction with the status quo, (5 farms).

It was seen that 3 of these farmers should begin to develop after the mass media show that current development methods are successful over a number of years. The other 2 farmers have no intention of developing and are not interested in advice.

(iii) Old and disabled farmers, (4 farms).

Two of these farmers have neither the managerial nor physical ability to increase production. The other 2 farmers could increase production if they employed labour to make up for their own physical limitations.

(iv) Sharefarming agreements, (3 farms).

On 2 farms where the sharemilking agreement had hindered increased production in the past the sons had just purchased the farms from their respective fathers and intended to increase production now. On the third farm in this category the sharemilking agreement made it unprofitable for the milker to employ labour, which would be required for cow numbers to be increased, with the present level of fixed inputs. Suggestions have been made for a new sharefarming agreement which would not contain the present innate tendency towards inefficiency.

(v) Labour shortage, (1 farm).

One farmer was primarily hindered from increasing production by a labour shortage. A district labour shortage may arise if large scale development takes place.

(vi) Fear of flooding, (1 farm).

A philosophy of farming which farms for the good years was discussed in relation to the floodable farms.

(vii) Cow ill-thrift, (1 farm).

This problem is statistically small but can involve a considerable loss to a developing farmer who becomes involved. Proper research is required.

(viii) Unsatisfactory supervised credit arrangement, (1 farm).

One farmer was hindered from increasing production by the financial arrangement which had been made for him by the Maori Affairs Department, and the quality of supervision provided.

This chapter has also discussed taxation, milking machines, and decision making as possible factors hindering increased production, although they were not found to be the major factor on any of the survey farms.

(i) Taxation

Taxation generally takes 50 per cent of the present value of added cash profits from development and as such is a major disincentive to increased production.

(ii) Milking machines

It was suggested that 60 per cent of farmers in Survey Group B could improve the efficiency of milking and the comfort to their cows by correctly adjusting their milking machines.

(iii) Decision making

A considerable need was seen for extension officers to educate Group B farmers in the use of a sound decision making pattern so that they could make better management decisions than at present.

Chapter 9 gives the author's recommendations for overcoming the above mentioned factors which were found to be hindering increased production.

CHAPTER 9

RECOMMENDATIONS FOR INCREASING PRODUCTION ON THE RANGITAIKI PLAINS AND IN GALATEA

9.1 Introduction

This chapter attempts to suggest remedies for the production problems which have been revealed in earlier chapters of the thesis.

The chapter is divided into two main sections. First, the problems which can be corrected at the local level are discussed. These include extension services, farm finance, farm labour, flooding, milking machine efficiency, and to some extent, cow illthrift. Secondly, the problems which would have to be corrected at the national level are considered. These include sharemilking agreements, taxation, unsatisfactory supervised credit arrangements, and old disabled farmers.

9.2 Recommendations for Overcoming Factors Hindering Increased Production which are Capable of Correction at the Local Level

9.2.1 Extension services

9.2.1,1 Paramount importance of extra extension effort

The survey results have shown that for development to proceed extra technical advice and/or boosting of confidence is needed on 15 farms (60 per cent) in Survey Group B.[1/]

---

1. See Section 7.2.1.

The reader is again reminded of the relative significance of the major factors found to be hindering increased production on each of the survey farms. These are as follows:

(i)	Lack of knowledge and confidence,	9 farms.
(ii)	Satisfaction with the status quo,	5 farms.
(iii)	Old and disabled farmers,	4 farms.
(iv)	Sharefarming agreements,	3 farms.
(v)	Labour shortage,	1 farm.
(vi)	Fear of flooding,	1 farm.
(vii)	Cow ill-thrift,	1 farm.
(viii)	Unsatisfactory supervised credit arrangements,	1 farm.

The above results clearly show that the lack of knowledge and confidence is the major factor hindering increased production on the survey farms, and for this to be overcome extra extension services are required.

The other factors listed above, although currently significant on some farms, are not of such major importance in the survey as a whole. In the future, labour, finance and equipment problems may arise if farmers accelerate their production. However, this will not occur until the lack of knowledge and confidence is overcome.

9.2.1,2 Current extension services to suppliers obviously inadequate

It has been shown that there is only about one full time extension officer available to the 588 suppliers to the Rangitaiki Plains Dairy Company who are not members of the Farm Improvement Club.[2/]

For an extension officer to provide a reasonably useful service to farmers he would need to make two or three major visits a year to each farm. An advisory officer providing such a service could handle about 200 farmers per year.[3/] Thus, in order to provide a reasonable advisory service in this district another two advisory officers would be required.

It has also been shown that the established government and industry extension services are unlikely to expand their efforts to fully develop the Rangitaiki Plains because, for political reasons, their services must be spread evenly throughout the country.[4/]

Farm Improvement Clubs or Private Consultants are unsuitable to assist the static farmers in this survey because they only service people who are willing to "go out and get extension for themselves".[5/]

---

2. See Section 2.8.

3. Dairy Board Consulting Officers make an annual average of 530 farm visits including individual contact and discussion groups. New Zealand Dairy Production and Marketing Board, "Farm Production Report and Summary of Board's Work 1964/65 Season", Op.cit., p.42.

4. See Section 8.2.3,2.

5. See Section 8.2.3,2.

As a result of the above it has been seen that the needed increased extension services will have to be provided on a new basis, say, the Dairy Factory, though other groups such as local stock firms or County Council could finance the service. In practice however, these latter alternatives are not at all likely to take place.

9.2.1,3 Summary of needed extension job

The extra extension effort required can be broken down into mass media, small groups, individual contact, and the relationship to the Rangitaiki Plains Demonstration Farm.

9.2.1,31 Mass media

The mass media used by about 50 per cent of the farmers in this survey are the Dairy Factory Newsletter, local farmer conferences, and success stories or general farming articles in farming journals or local newspapers. Television appears potentially to be a very useful extension media. The existing local radio farming programmes have very little value to the survey farmers.[6/]

The author would suggest that a wider telephone survey should be done to check the use of radio farming programmes. If the results confirm the impression gained in this survey, these programmes should either be improved or discontinued.

---

6. See Section 8.2.3,11.

The author recommends that the most useful mass extension media to use at present in this district are the Dairy Factory Newsletter, local farmer conferences, newspaper articles and television.

The author would also recommend the use of "Special Purpose Publications". These would be well prepared printed bulletins on topics of direct applicability to developing farmers, such as:

"Profitability of Farm Development on the Plains - 5 Case Examples"

"Sources of Credit on the Plains and How to Apply"

"How to Get High Producing Pastures in Galatea"

These bulletins would be distributed free to all suppliers.

The use and effectiveness of mass media may well change if:

(i) The form of the message is changed,

(ii) Farmer attitudes are changed,

(iii) The type of information being conveyed is changed.

An open attitude must be maintained towards the type of mass media to use and the information to be conveyed by this means. The above results have been found under the present situation. They may, however, change in the future.

9.2.1,32 Small groups

It has been shown that 46 per cent of Group B farmers are interested in joining a discussion group.[7/]

---

7. See Section 7.2.2,4.

If some of the farmers in the group are interested in, and are starting to develop, then these groups could be a very efficient extension method.

The author recommends that as farmers start to develop they should be encouraged to form discussion groups. A special bulletin may be useful to stimulate interest and provide information on establishing these groups.

9.2.1,33 Individual contact

It has been shown that 84 per cent of farmers in Survey Group B are willing to accept individual contact extension services.[8] Of these farmers, 38 per cent are unwilling to use other forms of direct extension services.

Thus individual contacts which can provide information, inspire confidence, and bring to adoption the farmers ideas,[9] can reach many farmers who would not be contacted by other means.

9.2.1,34 The Demonstration Farm

The Demonstration Farm does not provide a reason for the Rangitaiki Plains Dairy Company employing an extension officer. However, it would be logical if the factory had its own extension officer that he should act as the Liaison Officer for the farm.

---

8. See Section 7.2.2,1.
9. See Section 8.2.3,13 for the uses of individual contact extension services.

This would help to ensure a greater continuity in the control of the farm than has been the case to date, but it does not exclude the continuation of the existing co-operation between the local extension officers in formulating the farm's policy.

9.2.1,4 Cost of additional extension effort

9.2.1,41 Cost of a Consulting Officer

As the value obtained from appointing an extension officer will primarily depend on the man himself, it is desirable that the salary paid be sufficiently high to attract the best extension officer available.[10/]

The salaries of Farm Advisory Officers in the Department of Agriculture range from $2,450 to $3,130, with greater security and scope for promotion that the situation proposed here.

Farm Improvement Clubs generally pay salaries in the range of $3,000 to $4,000.

The position of a Dairy Factory Consulting Officer would be similar in terms of security and lack of opportunity for promotion, to a Farm Improvement Club Advisor. However, the Dairy Factory Consulting Officer would have to seek out his own clients and expect to be unwelcome on some farms visited, whereas the Farm Improvement

---

10. In the author's opinion the extension officer should be trained in farm management, and preferably also have extension and production economics training. Since he will be dealing with a lot of "non adopting" farmers some socio-psychological training would also be of value.

Club Advisor only visits farms where he is wanted. On the other hand, Farm Improvement Club Advisors are generally expected to provide a more intensive service, and keep more up to date with the latest farming developments than would be required by the proposed Dairy Factory Consulting Officer.

Overall the job of a Dairy Factory Consulting Officer would require a somewhat similar personal effort to that needed by a Farm Improvement Club Advisor. Thus to attract a good extension officer the author recommends a salary in the range of $3,200 to $4,800 depending on the applicant's experience and qualifications.

The author would estimate the following costs for employing one Farm Consulting Officer.[11]

Salary (up to)	4800
General administration	300
Car expenses	900
Insurance and superannuation	100
Total cost (up to)	$6100

The estimated total annual cost of employing a Farm Consulting Officer is from $4,500 to $6,100.

9.2.1,42 Free services

As the extra extension services are to be aimed at reaching the static farmers they are unlikely to succeed unless, in the first place at least, they are provided free.

11. These costs were estimated after reference to two Farm Improvement Club Balance Sheets.

The author would recommend that all farmers who are not already receiving at least one full day of extension worker's time per year should be offered, by the Factory Consultant, three major visits per year for three years and some budgeting working for "free". This offer would be made primarily by personal unsolicited visits, but the service would be widely publicized by mass media. The aim of this free advisory service would be to change 'static farmers' into 'developing farmers' by providing the management assistance they require.

After three years free advice the farmer would be expected to make other extension contacts such as joining the Farm Improvement Club or a discussion group, or using a Private Consultant.

The author found in Survey Group A that farmers wanted a more intensive extension service as they proceeded with development and recognised the value of past advice. Thus it would be expected that if the present 'static farmers' are given free advice for three years they will have learnt the value of this and will then be willing to pay for future advice.[12/]

9.2.1,43 Paid services

The Dairy Factory Consultant should encourage farmers as they leave the 'free service group' to make use of the present extension services, but if more farmers want discussion groups than are

---

12. The only compulsion put on the farmer will be that he leave the 'free service group' after three years. Although it will be expected that he will make use of other extension services, it will be his own personal decision to do so.

available from the Dairy Board Consulting Officer, the Factory Consultant could run these on a self-financing basis.

A fee of $22 per farmer would be reasonable for a group of 8 farmers to receive 12 half-days of advice per annum.[13]

The Directors of the Rangitaiki Plains Dairy Company should also maintain a flexible attitude towards allowing the Factory Consultantto give regular intensive advice to farmers at a fee similar to that of the Farm Improvement Club. They must be ready to recognise the need, and if other forms of extension organisation are not meeting the need, be willing to make one of the Factory Consultants available for this work, until a self-supporting group is established.

The author considers that there is currently a need for a Farm Improvement Club service in Galatea as well as on the Rangitaiki Plains. A group in Galatea could be established as a branch of the Whakatane Farm Improvement Club, or possibly a separate group could be formed within two years.

---

13. An advisor working full time on discussion groups could handle about 33 groups - this makes a total of 198 full working days per annum (a realistic figure after allowing for the liaison back up work needed by a good advisor). Gross income from 33 groups of 8 farmers each paying $22 = $5808. By comparison with Section 9.2.1,41 it can be seen that this would be about sufficient to cover the total cost of an extension officer.

9.2.1,5 Philosophy of factory support for extension work

9.2.1,51 Justifiable range of activity of a dairy factory

It may be argued that co-operatives (or indeed any organisation) should not move into fields already adequately catered for, however where services are inadequate to factory suppliers it has long been accepted that the factory should provide a service. The trading store and veterinary service provided by the Rangitaiki Plains Dairy Company are examples of this.

It has been shown in this survey that the existing extension services are inadequate to meet the needs of the suppliers to the Rangitaiki Plains Dairy Company for development. As it is unlikely that the existing free services will be increased, it is reasonable for the Dairy Company to consider providing these services.

9.2.1,52 Factory's participation in farming profitability

The profitability of dairy farming on the Rangitaiki Plains depends on:

(i) Maximising the value of production from the factory;

(ii) Minimising the factory processing and collection costs;

(iii) Minimising the per unit farm production costs.

The Rangitaiki Plains Dairy Company has an established and accepted responsibility for maximising the value of production from the factory, and minimising the factory processing and collection costs. The diversification of products, and the installation of new processing equipment in the factory, and large refrigerated vats on farms are indications of this.

So far as minimising the per unit farm production costs is concerned the Rangitaiki Plains Dairy Company has already accepted some responsibility by providing a veterinary service, Demonstration Farm, and Newsletter.

Thus, whilst the appointment of a Factory Consulting Officer would be a pioneering development in New Zealand, it would not really constitute a new area of functional responsibility for the Directors.[14]

9.2.1,53 Subsidising static farmers

The question may arise as to why progressive farmers should subsidise advice to static farmers. The reasons for this are, first, that the cost is trivial, and secondly, that increasing the efficiency of the farms 'at the lower end of the scale' will help good farmers improve their own management still further. Thus by increasing the number of extension officers in the district there will be either a direct or indirect benefit to all suppliers.

9.2.1,6 Recommendation on extension services

The author's recommendations to meet the required extra extension services to suppliers to the Rangitaiki Plains Dairy Company are given in this section.

---

14. It may be remembered that the Rangitaiki Plains Dairy Company pioneered the provision of a veterinary service by a dairy factory in New Zealand, a move which has been well worthwhile and followed in other districts.

9.2.1,61 Appointment of two "Farm Consultants"

The author recommends the appointment of two "Farm Consulting Officers" by the Rangitaiki Plains Dairy Company.

The first Farm Consulting Officer should be appointed immediately, and the second in twelve months' time.

The author's reasons for not employing both Farm Consulting Officers immediately are:

(i) The difficulty in finding two men of sufficient quality simultaneously, and

(ii) It is the author's opinion that it would be better for one man to establish himself in the area, and then for him to aid the establishment of the second man.

9.2.1,62 Terms of reference

This section outlines the work the author recommends that the Farm Consulting Officers should perform:

(i) Make unsolicited visits to farmers receiving less than one full day's individual extension service per year, offering them a free advisory service of three major visits per year plus budgeting assistance, for three years, after which they would be expected to find their own advice.

(ii) Make 'follow up' request visits to farmers initially contacted by the unsolicited visits.

(iii) In the case of the conventional extension services becoming overtaxed with farmers desiring advice after they are graduated from the 'free service group' the Farm Consulting Officers should be available to service discussion groups at a fee of about $22 per farmer for groups of 8 farmers, or individual advice at a fee similar to that of the Farm Improvement Club.

There would be no need for the factory advisor to enter the intensive advisory field on a permanent basis since for every 40 farmers requiring such a service, the Farm Improvement Club can add an advisor.

(iv) Use mass media such as the Dairy Factory Newsletter, local farmer conferences, newspaper articles and special bulletins to propagate modern farming technology and management.[15/]

---

15. In Section 8.2.3,1 it was suggested that mass media could currently be used in this district to supply farmers with information on the following topics:
   (i) The availability and type of service provided by extension officers;
   (ii) The current availability of finance and terms of lending;
   (iii) Cowshed design;
   (iv) Lucerne growth and management;
   (v) Pasture renewal and later calving;
   (vi) Increasing stocking rates;
   (vii) Development priorities.

   Group media or individual contact should provide information on the above subjects and in addition attempt to:
   (i) Develop the use of sound borrowing principles amongst farmers;
   (ii) Educate farmers in the decision making process;
   (iii) Widen farmers' knowledge on the productive potential of their land;
   (iv) Provide information on the type, rate and method of application of fertilizer.

   Information was available on all the above items where farmers' knowledge was lacking.

(v) Act as Liaison Officer for the Rangitaiki Plains Demonstration Farm,[16/] and in co-operation with the other extension officers in the district formulate the policy for this farm.

(vi) Without unnecessarily restricting the Farm Consulting Officer, he should be expected to report monthly to the Directors of the Rangitaiki Plains Dairy Company providing information on the progress of his job.[17/]

9.2.1,63 Number of farmers influenced

The farm Consulting Officer will only get about three weeks in four free for straight, in-the-field advisory work, or, say, 200 days a year.[18/] Allowing for three farm visits, some budgeting for

---

16. This would mean the withdrawal of this farm from the Whakatane Farm Improvement Club. Suitable explanatory statements for this action would need to be made to avoid damage to the image of the Farm Improvement Club.

17. The author recommends that the following information be supplied in the Farm Consulting Officer's monthly report:
    (i) Number of unsolicited visits made to 'static farmers';
    (ii) Percentage of unsolicited visits resulting in requests for farm budget or a repeat visit;
    (iii) Number of farm development budgets prepared for 'static farmers';
    (iv) Number of request visits to farmers who have been visited for less than three years;
    (v) Number of farmers assisted in arranging finance for farm development;
    (vi) Number of farmers who have graduated to being serviced by other extension services;
    (vii) A break-down of time spent on the various activities.

18. This allows for the amount of liaison back up work needed by a good advisor.

development, and possibly some assistance in applying for development finance, the Farm Consulting Officer would need to spend two to four days in the first year, and one to two days in the follow up years with each farmer.

At the same time, about 40 per cent[19/] of the advisor's unsolicited visits will turn out to be to farmers who don't want to develop, or who are unable to do so. The remainder will be to farmers who will then request return visits and farm budgets.

The above leads to the expectation that the Farm Consulting Officer would have an annual work pattern of approximately:

45 unsolicited visits resulting in requests for further visits,

30 unsolicited visits which do not justify return visits, and

90 visits to farmers who have had unsolicited visits in the previous two years.

In the first year the advisor should be able to make about 150 unsolicited visits, since he will not have the backlog of farmers from the previous two years. If a substantial demand for paid services builds up, the above working pattern could be affected.

---

19. See Section 9.2.1,1 for a breakdown of the major factors hindering increased production on the survey farms.

9.2.1,64 Co-ordination of extension effort

In order to prevent extension efforts doubling up on some farms while neglecting others, and to avoid the possible contradiction of ideas between extension workers which could degrade, in the farmers' eyes, the overall value of the extension service, it is essential that the integrated nature of the extension services that has prevailed on the Rangitaiki Plains in the past be maintained.

So long as it is clearly recognised that the Dairy Factory Consulting Officer is employed largely to encourage farmers to use the other extension services, no integration problems should arise.

The whole argument for the appointment of the Farm Consulting Officers is that there is a lack of available extension services and there is no hope of filling this gap by the existing services.

The suggested Farm Consulting Officers should only provide a regular semi-intensive individual advisory service to farmers for a limited period of time. Intensive advice on a regular basis is the province of Farm Improvement Clubs and Private Consultants. The Farm Consulting Officers will in no way displace the Department of Agriculture Farm Advisory Officers or the Dairy Board Consulting Officer because they are simply unable to provide sufficient services for the suppliers to the Rangitaiki Plains Dairy Company.

9.2.1,7 Conclusion

Overall the author considers that the appointment of two 'Farm Consulting Officers' by the Rangitaiki Plains Dairy Company will greatly accelerate the rate of adoption of modern technology on the 'static farms' in this district. The result will be a much more dynamic farming system generally and should increase the profitability of farming to all suppliers.

9.2.2 Finance

The author suggests that a total capital investment of about $6,000,000[20/] is required by all suppliers in order to realise the current potential on their farms, and that much of this money will have to be borrowed.

If development is to proceed under current lending arrangements[21/] farmers will have to reduce personal drawings for a time.

The development programmes in Appendix E show however, that even if personal drawings are reduced to $2,000 per year, some borrowed finance is required for rapid development.

Thus a good case can be made for attempting to change current lending policies or to create new lending institutions specially

---

20. This figure of $6,000,000 consists of an estimated:

    $2,000,000 for stock
    $1,500,000 for cowsheds
    $2,500,000 for fencing, draining and housing.

    See Section 8.2.2,24 for more details.

21. See Section 8.2.2,12.

tailored to the needs of a rapidly expanding agriculture.[22/]

There is also a need for extension officers to help farmers develop sounder borrowing principles.[23/]

A full study of farm finance on the Rangitaiki Plains and in Galatea was not possible within the limits of this survey. But it was evident that if all other factors hindering increased production were removed, then the policies of existing lending institutions would become a major hinderance to rapid development.

The author recommends that the Rangitaiki Plains Dairy Company keep the availability of farm development credit under review, with a view to attempting to influence credit policies or the establishment of new sources of credit, if a substantial shortage of farm development capital develops.

---

22. It was stated in Section 7.2.4,2 that farmers hesitated from borrowing for development because they had a fear of being unable to meet their repayments in a disaster year. The suggestion was made for the revision of lending terms whereby repayments (both interest and capital) be suspended in any year which is declared a natural disaster season. This would boost farmers' confidence in borrowing yet the author is confident that it would add little extra risk to lending institutions because as development proceeds droughts will have a much smaller effect on production. The availability of finance on productivity rather than security is also important for a rapidly expanding agriculture. For a fuller discussion of this see: Lewis, J.N., "Credit Facilities for Agriculture", Op.cit., and: Report Agricultural Development Conference 1963-1964, Government Printer, Wellington, New Zealand, 1966, p.45.

23. See Section 8.2.2,12.

9.2.3 Farm Labour

It has been suggested above that about 350 extra labour units would be required for full development of the district.[24/]

At a future date, and depending on the actual scarcity (and cost) of good farm labour, a special study of farm labour in the Rangitaiki Plains and Galatea districts may become worthwhile.

9.2.4 Flooding

It was suggested above[25/] that on farms of suppliers to the Rangitaiki Plains Dairy Company which are subject to flooding, it is probably best to farm for the good years so as to take full advantage of the good seasons.

Increasing production on the farms subject to flooding requires the convincing of a small number of farmers that it is worthwhile to farm for the good years. A bulletin discussing "High Versus Low Production on Floodable Farms" could be printed, and together with follow-up personal contact, be used to build up this confidence.

9.2.5 Milking machines

The author recommends that extension workers, in personal contact and through mass media, advise farmers of the importance of the correct adjustment of milking machines,[26/] and that a free machine

---

24. See Section 8.6.2.

25. See Section 8.7 for a discussion of the significance of flooding, and a suggested attitude towards this problem.

26. The milking machine checks carried out in conjunction with this survey suggested that adjustment to the milking plant was desirable on 60% of farms. See Section 8.11.

check service is available from Farm Dairy Instructors over the winter.

9.2.6 Cow ill-thrift

The author recommends that in this coming season (1967/68) a record be made of all herds affected by cow ill-thrift[27] to assess the severity of the problem and to estimate the resulting reduction in production. This survey would be best carried out by the Department of Agriculture Farm Advisory Officers. Provided these results show a severe district problem they should be combined with information obtained in past years and presented with a persistent plea to Ruakura Animal Research Station for trained research workers to investigate the problem. Enquiries should also be made to see if a similar problem has been noticed in other districts.

9.3 Recommendations for Overcoming Factors Hindering Increased Butterfat Production that must be Corrected on the National Level

9.3.1 Sharemilking agreements

The present 29 and 39 per cent sharemilking agreements exist by Act of Parliament. The author would recommend that the Government be urged to revise them so as to avoid the inherent tendency to inefficiency.[28] In considering this revision the Government should be encouraged to give due consideration to the following proposals made

---

27. For a discussion of the nature of this problem see Section 8.8.
28. See Section 8.5 for the effects of the present sharemilking agreements in hindering increased production.

by Candler as a basis for a new sharefarming agreement.

"(i) A Farm Budget for the period of the agreement, with appendices detailing particular husbandry practices to be followed.

(ii) A Financial Agreement as to how the earnings of the farm were to be divided between cash costs, the owner, and the sharefarmer."[29]

9.3.2 Taxation

Taxation was not felt to be a major factor hindering increased production by the survey farmers, though it was starting to affect decisions of some developing farmers.

The results of the actual profitability studies showed that of 4 profitable programmes examined taxation took an average of 47.2 per cent of the present value of the added cash profits.[30]

On another 5 farms where proposed development was evaluated it was seen that taxation took an average of 52.5 per cent of the present value of added cash profits.[31]

Although these figures are not as significant as those obtained by Cartwright,[32] and Holden[33] they would support the

---

29. Candler, W.V., "A New Look at Share Farming Agreements", Op.cit.
30. See Section 6.6.2.
31. See Appendix F.6.
32. Cartwright, R.W., "The Impact of Taxation on the Profitability of Farm Development in New Zealand", Op.cit.
33. Holden, J.S., "The Economics of Hill Country Development", Proceedings of the New Zealand Grasslands Association, 1965.

recommendations of Candler,[34/][35/] and of Cartwright[36/] to the Taxation Review Committee for a thorough review of the present taxation system and the investigation of new systems such as a 'factor tax' for agriculture.

9.3.3 Unsatisfactory supervised credit arrangements

It was shown[37/] that 1 Maori farmer was hindered from increasing production because of strict budgetary supervision by the Maori Affairs Department which resulted in zero incentive to develop, since increased production went to pay off indebtedness to the department, while his personal drawings were held constant at $900 per annum.

This one case is insufficient to infer that arrangements for budgetary supervision by the Maori Affairs Department result in a lack of incentive to develop, but the hypothesis may be advanced that Maori farmers tend to have special problems. A survey, such as the present one, on a nation wide basis may be justified to find where Maori farmers generally have any special problems not shared by European farmers. The person doing such a survey would need to be not only trained in agriculture, but also be a Maori, or at least be well versed in Maori tradition on the one hand, and Maori point of view on the other.

---

34. Candler, W.V., "Taxation for Development, Part II", Discussion Paper No.13, Department of Agricultural Economics and Farm Management, Massey University of Manawatu, 1964.

35. Candler, W.V., "Incentives for Increased Output of Farm Products", Op.cit.

36. Cartwright, R.W., "The Impact of Taxation on the Profitability of Farm Department in New Zealand", Op.cit.

37. See Section 8.9.

9.3.4 Old and disabled farmers

The cost to the nation of allowing old and disabled farmers to continue on their land[38/] would suggest that a nation wide survey, such as the present one, studying old and disabled farmers, to find the national cost of allowing them to remain on their farms, and the incentives required to encourage them off the land, may be worthwhile.

9.4 Conclusion

The recommendations for overcoming the factors shown in this survey to be hindering increased production on the Rangitaiki Plains and in Galatea have been discussed above.

The main recommendation has been the appointment of two "Farm Consulting Officers" by the Rangitaiki Plains Dairy Company in order to provide the extra extension services required by the suppliers to this company.

The other less immediately important items discussed which could be corrected at the local level were farm finance, farm labour, flooding, milking machine efficiency, and cow ill-thrift.

Farm finance and labour were discussed as problems to be watched in the future. Flooding fear and milking machine efficiency were discussed as items which mass media could help to improve immediately. For cow ill-thrift it was suggested that records be kept with the view to getting research done on the problem.

---

38. See Section 8.4.2.

The problems discussed which must be dealt with on a national level were sharemilking agreements, taxation, unsatisfactory supervised credit arrangements, and old and disabled farmers. Recommendations were made for the review of sharemilking agreements and taxation. A survey was suggested to investigate the hypothesis that Maori farmers may suffer special problems either under the budgetary supervision of the Maori Affairs Department or from other causes, and finally another survey was suggested to fully investigate the situation of old and disabled farmers.

CHAPTER 10

SUMMARY AND CONCLUSIONS

10.1 Summary of Survey Procedure and Results

This thesis has reported the results of a survey studying factors hindering increased butterfat production on the Rangitaiki Plains and in Galatea.

The survey was designed specifically to study and evaluate the farm development methods being used on the Rangitaiki Plains and in Galatea, and then to discover the factors that led some farmers to increase production at a much slower rate than the average.

The survey farms consisted of 12 purposively selected farms (Survey Group A) on which production had increased substantially to a high level over the preceding five years, and 25 randomly selected farms (Survey Group B) which were taken from the sixth of the suppliers to the Rangitaiki Plains Dairy Company who had increased production by less than 2 per cent per annum over the preceding five years and who were at a low absolute level of production.[1/]

Each of the farms selected was visited for a day. This enabled the author to make a detailed whole farm study.

The interview technique was very flexible and was adjusted to suit individual farmers. In every case, however, the interview included a full farm inspection, discussion with the farmer on resources,

---

1. A low level of production was arbitrarily defined as being less than 70% of the maximum production obtained on the same soil group in the 1964/65 season.

management practices, financial information, personal goals and development possibilities.

Five case studies of the profitability of farm development were made. These showed that in four cases development proved highly profitable to the farmer, even in the post tax situation. In these profitable cases the top priority in development had been to increase stock numbers. Fertilizer, regrassing, drainage, fences, and buildings were added as complementary inputs only as they were needed. In the fifth case study of profitability, "development" had proceeded by only slightly increasing stock numbers, while adding a lot of non-productive improvements. This programme proved unprofitable, both before and after tax.

It was concluded that development is generally profitable, provided that a high stocking rate is seen as the main objective of development, and that improvements are only added when they contribute to permitting larger stock numbers to be run.

During the interviews with the farmers in Group B, the author was primarily concerned with finding out the factors that were hindering them from increasing butterfat production. Due to the close firm-household interactions in farming, the household situation was also studied as closely as possible during the interview.[2/]

Chapter 7 discussed farmers' attitudes towards development, and extension services; farm knowledge level; farmer credit position; family situation; and risk aversion.

---

2. Without the author enquiring into private matters, or appearing over interested in personal problems.

There were four main attitudes prevalent amongst the farmers in Survey Group B towards development, which can be summarized as:

(i) Nine farmers who were interested in development but who lacked technical knowledge and confidence as to how to develop;

(ii) Five farmers who were interested in, and knew how to develop, but were hindered by some physical factor;

(iii) Six farmers who were interested in development but who lacked technical knowledge and confidence as to how to develop, and who were also hindered by some physical factor;

(iv) Five farmers who were satisfied with the status quo and were uninterested in development, or were very sceptical of present development methods.

The farmers' attitudes to extension services showed that, although only 10 out of the 25 farmers in Group B had had direct contact with extension officers for extension purposes over the last five years, 21 out of the 25 farmers were willing to talk to an extension officer if he arrived on the farm.

The author also found that small groups would be effective in reaching 46 per cent of Group B farmers, and that various forms of mass media reach about 50 per cent of farmers.

With regard to the farmer knowledge level the author found that a lack of knowledge was widespread amongstthe farmers in Group B.

Knowledge was lacking on both the services available to farmers, and on the technical and financial information required for development.

The author concluded from the farm interviews that a lack of knowledge was the major factor hindering increased butterfat production on 9 farms, and that out of the remaining 16 farms, another 6 farmers would need extra knowledge, even when other more immediately prevalent obstacles were removed.

This major finding on the lack of farmer knowledge and confidence supported the ideas of the local extension officers who feel that the basic need for increasing production is to boost farmers' confidence in what can be achieved on their farms, and to provide technical knowledge as to how to go about this.

10.2 District Barriers to Increased Production

If district development is rapidly accelerated resources which may be readily available to an individual farmer may be unavailable to the district as a whole. This may be seen from the following requirements estimated for all suppliers for increasing production to the current potential:[3]

(i) Cows - 20,000 head

(ii) Number of cowsheds - 250

(iii) Labour - 350 men

(iv) Other items including housing and fencing materials

(v) Total capital - $6,000,000

---

3. Current potential has been defined as the top level of production on farms, within soil groups, in the 1964/65 season.

10.3 The Extension Problem

It has been shown above that the lack of knowledge and confidence was the major factor found to be hindering increased production on the farms in Survey Group B.

10.3.1 Extension messages required

Information is required on the availability of extension services and finance, as well as technical knowledge. The main technical knowledge required is to deal with two basic problems. First, low stocking rate and, secondly, low per cow production. The required technical knowledge would include information on later calving, higher stocking rates, fertilizer rates, pasture improvement, drainage and lucerne management.

10.3.2 Media

Mass and group media as well as individual contacts all have a part to play in providing the extension services required by suppliers to the Rangitaiki Plains Dairy Company.[4/]

The currently most useful forms of mass media were found to be the Dairy Factory Newsletter, local farmer conferences, and general farming articles in local newspapers or farming journals. Television and special bulletins were also suggested as potentially very useful extension media.

---

4. The specific information to be supplied by each media was suggested as a footnote in Section 9.2.1,62.

Farmers who are presently receiving little extension advice showed considerable interest in joining discussion groups. These groups should be potentially very useful for extension provided at least some members of the group are keen to develop.

It was seen that individual contact services would be accepted by 84 per cent of farmers in Group B, but that there was currently only about one full time extension officer available to 588 suppliers and consequently many farmers who would accept advice could not be served.

10.3.3 Farm Consulting Officers

In order to provide the extra extension services required in the district the author recommends that the Rangitaiki Plains Dairy Company employ two "Farm Consulting Officers" who would offer a semi-intensive free advisory service to farmers who are currently receiving less than one full days advice per year. This service would involve three major visits per year for three years, after which the farmer would be expected to find his own advice, presumably in discussion groups or intensive individual advisory services.

If the existing extension services do not expand rapidly enough to provide the extra services required by farmers, then the Dairy Factory Consulting Officer should be temporarily available to provide a paid service.

It is recommended that one Farm Consulting Officer be employed immediately and one in a year's time.

10.4 Other Factors Limiting Production

The lack of knowledge and confidence was the major factor found to be hindering increased production on the survey farms. The other problems the author found were less significant overall, but were still important on some farms. These factors were divided into those which could be dealt with on the local level, and those which must be dealt with on a national level.

10.4.1 Local problems

The problems which could be overcome on a local level were:

(i) Farm finance;

(ii) Farm labour;

(iii) Fear of flooding;

(iv) Milking machine efficiency;

(v) Cow ill-thrift.

Farm labour and finance were discussed as problems to be watched in the future. Fear of flooding and milking machine efficiency were discussed as items which mass media could help to improve immediately. For cow ill-thrift it was suggested that records be kept of the significance of the problem with a view to getting official research work done.

10.4.2 National problem

The factors found to be hindering increased production which would have to be dealt with on a national level were:

(i) Sharefarming agreements;

(ii) Taxation;

(iii) Unsatisfactory supervised credit arrangements;

(iv) Old and disabled farmers.

Recommendations were made for the review of sharemilking agreements and taxation. A survey was suggested to investigate the hypothesis that Maori farmers may suffer special problems when under budgetary supervision, and another survey was suggested to fully investigate the situation of old and disabled farmers.

10.5 General Conclusions

The following conclusions refer particularly to the sixth of the suppliers to the Rangitaiki Plains Dairy Company who have had the slowest rate of increase in production and who are at a low absolute level of production.

With respect to these farmers it would appear that only 20 per cent are simply not interested in development by present methods. On the other hand 36 per cent are only prevented from increasing production by lack of knowledge and confidence (or inadequate extension resources in the district). The balance, 44 per cent of farmers, appear to be limited by physical factors (or physical factors and lack of knowledge). There are however six distinct physical factors[5] which limit production in particular cases.

As a single limitation to production the lack of extension resources available to suppliers to the Rangitaiki Plains Dairy Company appears to be more than twice as important as any other factor. Given the difficulty of getting a doubling or tripling of extension personnel for the whole dairy industry, the author has been forced to the conclusion that the Rangitaiki Plains Dairy Company should consider taking steps to remedy the current shortage of extension services available to its suppliers.

5. See Section 9.2.1,¶ for a listing of these factors.

BIBLIOGRAPHY

Anderson, R.M., and Eichhorn, R.L., "Correlates of Labour Efficiency Amongst Older Farmers in Poor Health", Rural Sociology, 29, 2, 1964.

Anon., "Block Wintering", The New Zealand Farmer, August 26, 1965.

_____., "Nurse cows rear Calves in 500 Cow Herd", The New Zealand Farmer, November 18, 1965.

_____., "Rangitaiki Plains Demonstration Farm", The New Zealand Farmer, July 15, 1965.

Ashworth, V., "Dairy Farmers Calendar", The New Zealand Farmer, February 24, 1966.

Barnes, F.R., "270 in one Batch", Dairyfarming Annual, Massey University, 1966.

Bay of Plenty Catchment Commission, "Whakatane River Major Scheme", Unpublished Report.

Beal, G.M., and Bohlen, J.M., "The Diffusion Process", Report assembled by the sub-committee for the Study of Diffusion of New Ideas and Farm Practices of the North Central Rural Sociology Committee, Mimeo.

Bierman, H., and Smidt, S., "The Capital Budgeting Decision", The Macmillan Company, New York, 1960.

Bradley, H.O., "Rural Finance: State Advances Corporation Policy", Sheepfarming Annual, Massey University, 1966.

Budge, A.A., "A Banker Looks at Sources of Farm Finance", Dairyfarming Annual, Massey University, 1966.

Campbell, I.L., "Are We Using the Right Breed?", Dairyfarming Annual, Massey University, 1966.

_____________., "The Use of Buttermilk Power in Calf-Rearing", Dairyfarming Annual, Massey Agricultural College, 1960.

Campbell, K.O., "Farm Decision Making and its Implications for Agricultural Extension", Australian Agricultural Extension Conference 1962, Reviews, Papers, and Reports, Commonwealth Scientific and Industrial Research Organization, Melbourne, 1963.

Candler, W.V., "A New Look at Sharefarming Agreements", Dairyfarming Annual, Massey University of Manawatu, 1965.

____________., "A Study of the Economics of Bulk Handling of Wheat on Farms", Review of Marketing and Agricultural Economics, 27, 2, 1959.

____________., "Incentives for Increased Output of Farm Products", Lincoln College Farmers' Conference, 1964.

____________., "Production Economics and Problems of Animal Production", Proceedings of the New Zealand Society of Animal Production, 22, 1962.

____________., "Taxation for Development, Part II", Discussion Paper No.13, Department of Agricultural Economics and Farm Management, Massey University of Manawatu, 1964.

____________., "The Role of Farm Management Surveys", Discussion Paper No.39, Department of Agricultural Economics and Farm Management, Massey University of Manawatu, 1965.

Carr, C.E.S., "Adjust Time of Calving", Dairyfarming Annual, Massey University of Manawatu, 1964.

Cartwright, R.W., "The Impact of Taxation on the Profitability of Farm Development in New Zealand", Discussion Paper No.46, Department of Agricultural Economics and Farm Management, Massey University, 1967.

______________., "The Potential for Increased Production on Sheep Farms in Wairoa County", Unpublished M.Agr.Sc. Thesis, Massey University, 1967.

Chisholm, A.H., "An Economic Comparison of Forestry and Agriculture", Discussion Paper No.30, Department of Agricultural Economics and Farm Management, Massey University of Manawatu, 1963.

Copp, J.H., Sill, M.L., and Brown, E.J., "The Function of Information Sources in the Farm Practice Adoption Process", Rural Sociology, 23, 1958.

Davey, A.W.F., "Feeding Calves on Buttermilk Powder", Dairyfarming Annual, Massey College, 1962.

____________., "Principles of Calf Rearing", Dairyfarming Annual, Massey University, 1966.

Department of Scientific and Industrial Research, "Soil, Forestry and Agriculture of the Northern Part, Kaingaroa State Forest and the Galatea Basin", Soil Bureau Bulletin 18, 1960.

Dudman, R., "The Methodology of Research in Agricultural Economics", Journal of Agricultural Economics, 15, 4, 1963.

Easton, J.D., "Calf Rearing Made Easy", Dairyfarming Annual, Massey University, 1966.

"Extracts from New Zealand Gazette", New Zealand Meteorological Service, Wellington.

Frampton, A., "The Economics of Growing Sugar Beet on Farms in South Otago", Unpublished M.Agr.Sc. Thesis, Massey University of Manawatu, 1964.

Graham, J.V., and Candler, W.V., "Cows, Fertilizer, Production, Profit", Department of Agricultural Economics and Farm Management, Massey University College of Manawatu, 1963.

Graham, J.V., "Report on a Taranaki Survey", Dairyfarming Annual, Massey University of Manawatu, 1964.

__________., "The Economics of High Rates of Fertilizer on South Taranaki Dairy Farms", Unpublished M.Agr.Sc. Thesis, Massey University of Manawatu, 1964.

Heady, E.O., "Economics of Agricultural Production and Resource Use", Prentice-Hall Inc., New Jersey, 1951.

Hewitt, S.R., and Pullar, W.A., "Pasture Problems on Tarawera Ash on Rangitaiki Plains", New Zealand Journal of Agriculture, June 1962.

Holden, J.S., "The Economics of Hill Country Development", Proceedings of New Zealand Grasslands Association, 1965.

Hudson, A.W., "The Farm Improvement Club Movement and the Place of the General Adviser in Agriculture", New Zealand Institute of Agricultural Science, 1955.

Hutton, J.B., "Feeding Cows well in Early Lactation", Dairyfarming Annual, Massey University, 1966.

Lake, H.R., "Budget 1966", Government Printer, Wellington, 1966.

Leagans, J.P., "Some Principles and Concepts of Extension Programme Development", Cornell University, Ithaca.

Lewis, J.N., "Credit Facilities for Agriculture", Quarterly Review of Agricultural Economics, VIII, 4, 1955.

Mason, R.G., "The Use of Information Sources in the Process of Adoption", Rural Sociology, 29, 1964.

McCannon, E.R., "Making the Most of Television Time", Department of Agricultural Journalism, University of Wisconsin, Bulletin 20, November 1956.

McMeekan, C.P., "Factors Affecting the Efficiency of Conversion of Pastures to Butterfat", Proceedings Ruakura Farmers' Conference, 1959.

_____________., "The Pros and Cons of High Stocking Rate", Dairy-farming Annual, Massey Agricultural College, 1961.

_____________., "The Pros and Cons of High Stocking Rate", Proceedings Ruakura Farmers' Conference, 1961.

McMillion, M.B., "The Sources of Information and Factors which Influence Farmers in Adopting Recommended Practices in Two New Zealand Counties", Lincoln College Technical Publication, No.19, 1960.

New Zealand Dairy Board, "A survey of the economic structure of factory supply dairy farms in New Zealand in 1963/64", Wellington, 1966.

New Zealand Dairy Production and Marketing Board, "Farm Production Report and Summary of Board's Work 1946/47 Season", Wellington, 1948, No.23.

____, "Farm Production Report and Summary of Board's Work 1962/63 Season", Wellington, 1964, No.39.

____, "Farm Production Report and Summary of Board's Work 1964/65 Season", Wellington, 1966, No.41.

New Zealand Department of Agriculture, "Bovine Tuberculosis", Wellington, 15 February, 1966.

Presser, H.A., and Russell, H.M., "Acceptance of Research Results by Farmers", Review of Marketing and Agricultural Economics, 33, 3, 1965.

Pullar, W.A., Vucetich, G.G., Hewitt, S.R., McLean, I., Unpublished Report for Soil Survey Conference, Whakatane, 1965.

Read, H., "The Effective Role of Mass Media in Agricultural Extension Education", Australian Agricultural Extension Conference 1962, Reviews, Papers, and Reports, Commonwealth Scientific and Industrial Research Organization, Melbourne, 1963.

Report Agricultural Development Conference 1963-64, Government Printer, Wellington, New Zealand, 1966.

Report by No.6 Committee on Workshop No.1, N.Z.I.A.S. Massey College Extension Workshop, 1961.

Rodgers, E.M., and Beal, G.M., "The Importance of Personal Influence in the Adoption of Technological Changes", Social Forces, 36, 1958.

Routhe, H.G., "The Application of Decision Making Processes in Extension Work in Farm Management", Journal of Farm Economics, 44, 5, 1962.

Salter, L.A., "Cross-Sectional and Case-Grouping Procedures in Research Analysis", Journal of Farm Economics, 24, 1942.

Sargent, E.D., "Some Problems Arising from Present Share-farming Agreements", Dairyfarming Annual, Massey University of Manawatu, 1965.

Schapper, H.P., "Farm Management Clubs", Australian Agricultural Extension Conference 1962, Reviews, Papers, and Reports, Commonwealth Scientific and Industrial Research Organization, Melbourne, 1963.

_______________., "Uses and Limitations of Farm Surveys", Review of Marketing and Agricultural Economics, 25, 1-2, 1957.

Scott, J.D.J., "What's Wrong with Your Production?", Proceedings Ruakura Farmers' Conference, 1960.

Scott, J., "The Economic Implications of Re-Combined Milk for Town Milk Farmers in the Manawatu", Unpublished M.Agr.Sc. Thesis, Massey University, Forthcoming.

Vaile, E.E., "Pioneering the Pumice", Whitcombe and Tombs Limited, Wellington, 1939.

Vroom, V.H., "Work and Motivation", John Wiley and Sons, Inc., New York, 1964.

Wadsworth, H.A., "Evaluating Farm Investments by Capital Budgeting", Journal of Farm Economics, 14, 5, 1962.

Ward, A.B., "The Use of the Telephones as a Survey Method. Some Preliminary Results", Discussion Paper No.45, Department of Agricultural Economics and Farm Management, Massey University, 1967.

Ward, J.T., "Investment Analysis for Farm Improvement", Agricultural Economics Research Unit, Lincoln College, Publication No.9, 1964.

Warren, G.F., "Agricultural Surveys", Cornell Agricultural Experiment Station Bulletin 344, 1914.

Wesney, D., "A Study of the Financial Returns to Process Pea Growers in Hawke's Bay", Unpublished M.Agr.Sc. Thesis, Massey University of Manawatu, 1964.

Whittlestone, W.G., "Milking Sheds and Plants of the Future", Dairyfarming Annual, Massey University, 1966.

Wilkening, E.A., "A Sociopsychological Approach to the Study of the Acceptance of Innovations in Farming", Rural Sociology, 15, 4, 1950.

Williams, D.B., Parish, R., and Bollen, A.G., "Attitudes and Expectations of Wheat Growers in New South Wales", Review of Marketing and Agricultural Economics, 21, 1, 1953.

Wright, A., "The Development of Unploughable Hill Country", Unpublished M.Agr.Sc. Thesis, Massey University of Manawatu, 1963.

APPENDIX A

SURVEY QUESTIONNAIRES

A.1 Survey Check List

1. The Farmer.

   Years in occuption of the farm.

   Personal background.

2. Land and Improvements.

   Tenure, description, area, government valuation, original cover, contour, climate, soils.

3. State of Development and Condition of Improvements.

   Pastures, drainage, subdivision, water supply, buildings, pests and diseases.

4. Input-Output Data.

   Information over the past 5 years on: stock numbers, production figures, manure, labour, plant and equipment, stock feeding and stock policies.

5. Accounts over the Past 5 ears.

6. Development Programme.

   Work involved, costs and future aims.

7. Attitude Towards Borrowing Finance for Development.

8. Use of Extension Services.

9. Attitude Towards the Rangitaiki Plains Demonstration Farm, and the Dairy Factory Newsletter.

A.2 Telephone Survey Questionnaire.

Supplier No. ....
Name ....
Survey No. ....

1. What farming journals do you receive?

   Straight furrow ....
   N.Z. Exporter ....
   N.Z. Farmer ....
   N.Z. Journal of Agriculture ....

   What type of article do you like best?

   No comment ....
   Seasonal notes ....
   Local success stories ....
   Professional hints ....
   General farming articles ....

2. What radio farming programmes do you listen to?

3. Have you a T.V. set?

4. Have you been to the Ruakura Farmers Conference in the last 5 years. ....

5. Did you go to the Whakatane/Galatea Farmers Conference last year. ....

6. Have you visited the Rangitaiki Plairs Demonstration Farm since it started? ....

   How many times have you visited it? ....

7. If a monthly Discussion Group was established amongst your friends, with an Extension Officer present, would you be willing to join it? ....

8. What sort of fertilizer are you using this year? ....
   ....

   How much ....

   Is this more than last year? ....

Why has it changed? ....

....

Is the fertilizer being applied in split dressings?

....

How is the fertilizer being applied? ....

....

APPENDIX B

RESOURCES, PRODUCTION, AND MANAGEMENT ON THE SURVEY FARMS

This appendix gives the individual farm details for items described more generally in Chapter 5. It covers fertilizer application information, stock and production figures, wintering methods and supplementary feeds, and the capital situation.

B.1 Fertilizer

Tables B.1 and B.2 respectively show the type, rate, time and method of application of fertilizer on the farms in Survey Groups A and B.

B.2 Stock and Production

Tables B.3 and B.4 respectively show the cow numbers, cows per acre, total butterfat production, butterfat per cow, and butterfat per acre for the two seasons 1964/65 and 1965/66, and the percentage increase in production over the five years 1960/61 to 1964/65 for the farms in Survey Groups A and B.

B.3 Wintering Methods and Supplementary Feed

Tables B.5 and B.6 respectively show the wintering method, and the type and rate of usage, of supplementary feeds on the farms in Survey Groups A and B.

Table B.1 Fertiliser Usage on Farms in Survey Group A

Soil Group	Survey Farm Number	1963/64 Spring Type	1963/64 Spring Rate	1963/64 Autumn Type	1963/64 Autumn Rate	1964/65 Spring Type	1964/65 Spring Rate	1964/65 Autumn Type	1964/65 Autumn Rate	1965/66 Spring Type	1965/66 Spring Rate	1965/66 Autumn Type	1965/66 Autumn Rate	Method of application
1 - 2	12 *	30-KP	1	30-KP	1	30-KP	1.5	30-KP	1.5	30-KP	1.5	30-KP	2	Bulk lorry
2	1 +		Nil	30-KP	4		Nil	30-KP	5	50-KP	3	30-KP	3	Spinner
2	5 *	30-KP	3	30-KP	3	30-KP	3	30-KP	3	30-KP	3	30-KP	4	Bulk lorry
2	6 *		Nil	30-KP	4.5		Nil	30-KP	4.5	30-KP	2	30-KP	4	Spinner
2	11 *	30-KP	2.5	15-KP	2.5	30-KP	2.5	15-KP	2.5	30-KP	2.5	15-KP	2.5	Spinner
3	2 *		Nil	30-KP	6	30-KP	4	30-KP	4	30-KP	4	30-KP	4	Bulk lorry
3	9 +		Nil	50-KP	3	30-KP	3	30-KP	3	50-KP	3	Cu.Co. 30-KP	3	Bulk lorry
3	10 +	30-KP	1.5	30-KP	3	30-KP	1.5	30-KP	3.5	30-KP	1.5	30-KP	3.5	Spinner
4	3 +		Nil	30-KP	3		Nil	30-KP	4	30-KP	3	30-KP	4	Spinner
4	4 *		Nil	30-KP	3.5	30-KP	2	30-KP	3	30-KP	3	30-KP	3	Farm bulk
4	7 +		Nil	30-KP	3		Nil	30-KP	3		Nil	30-KP	3	Spinner
4	8 *		Nil	30-KP	3		Nil	30-KP	4.5	30-KP	2.5	30-KP	3	Spinner

Type: x-KP = x% Potassic superphosphate

Cu.Co:P = copperized or cobaltized superphosphate

Rate: The rate is given in cwt per acre, i.e. total fertilizer divided by total farm acreage.

* = Fast high producing farms + = Slow high producing farms

Table B.2 Fertilizer Usage on Farms in Survey Group B

Soil Group	Survey Farm Number	1963/64 Spring Type	1963/64 Spring Rate	1963/64 Autumn Type	1963/64 Autumn Rate	1964/65 Spring Type	1964/65 Spring Rate	1964/65 Autumn Type	1964/65 Autumn Rate	1965/66 Spring Type	1965/66 Spring Rate	1965/66 Autumn Type	1965/66 Autumn Rate	Method of application
1	20 +	30-KP	2.5		Nil	30-KP	3		Nil	30-KP	3		Nil	Bulk lorry
1	21 *	Cu.Co.P	3		Nil	Cu.Co.P	2		Nil	Cu.Co.P	2		Nil	Spinner
1	22 +	P	4		Nil	P	4		Nil	Cu.Co.P	4		Nil	Spinner
1	25 +		Nil	30-KP	2.5		Nil	30-KP	2.5		Nil	30-KP	2.5	Bulk lorry
1	36 +	30-KP	2.5		Nil	30-KP	2.5		Nil	30-KP	2.5		Nil	Bulk lorry
1	37 *	P	2.5		Nil	P	2.5		Nil	P	2.5		Nil	Bulk lorry
2	18 *	Cu.P	5		Nil	30-KP	2		Nil	Co.P	2		Nil	Bulk lorry
2	19 *	30-KP	3		Nil	30-KP	3		Nil	Cu.Co. 30-KP	3			Bulk lorry
2	24 +		Nil	P	4.5		Nil	P	4.5	30-KP	2.5	30-KP	2.5	Bulk lorry
2	30 +		Nil	A	3.5		Nil	A	3.5		Nil	A	3.5	Aerial
2	31 +		Nil	30-KP	5		Nil	30-KP	5	Cu.Co.P	1.5	30-KP	5	Spinner
2	35 +		Nil	30-KP	3		Nil	30-KP	3		Nil	30-KP	3	Spinner
3	13 *	30-KP	3	30-KP	3	30-KP	3	30-KP	3	30-KP	3	30-KP	3	Spinner
3	16 +		Nil	30-KP	2.5		Nil	P	3		Nil	P	3.5	Bulk lorry
3	27 *		Nil	30-KP	3.3		Nil	P	3.5	Cu.P	1.8	30-KP	1.3	Aerial
3	32 +		Nil	P	0.7		Nil	P	0.7		Nil	P	0.7	Spinner
3	34 +		Nil	Cu.P	3		Nil	30-KP	3		Nil	P	3	Bulk lorry
4	14 *	30-KP	3		Nil	30-KP	3		Nil	30-KP	3		Nil	Spinner
4	15 +		Nil	P	2		Nil	P	2		Nil	P	2	Spinner
4	23 +		Nil	30-KP	1.5		Nil	30-KP	2		Nil	30-KP	2	Spinner
4	26 *		Nil	30-KP	3		Nil	30-KP	6		Nil	P	6	Bulk lorry
4	28 +	30-KP	2.5	P	2.5	30-KP	2.5	P	2.5	30-KP	2.5	P	2.5	Bulk lorry
4	29 +		Nil	P	1		Nil	30-KP	1.5	30-KP	1	P	1.5	Spinner
4	33 *	30-KP	4		Nil	30-KP	4		Nil	30-KP	4		Nil	Bulk lorry

Type: x-KP = x% Potassic superphosphate
P = Straight superphosphate
Cu.Co.P = Copperized or cobaltized superphosphate

Rate: The rate is given in cwt per acre, i.e. total fertilizer divided by total farm acreage.

* = Progressive low producing farms   + = Static low producing farms

Table B. 3

Stock and Production on Farms in Survey Group A
in 1964/65 and 1965/66

Soil Group	Survey Farm Number	1964/65 season					1965/66 season					Percent increase 5 years
		Cow numbers	Cows/acre	Butterfat	Butterfat/cow	Butterfat/acre	Cow numbers	Cows/acre	Butterfat	Butterfat/cow	Butterfat/acre	
1 & 2	12 *	172	0.49	49958	291	143	180	0.51	48737	271	139	15.8
2	1 +	169	0.91	59012	347	317	181	0.97	58956	326	317	2.1
2	5 *	90	0.86	30258	336	288	104	1.00	36293	349	346	22.2
2	6 *	114	0.78	35074	308	238	123	0.84	41546	338	283	8.9
2	11 *	112	0.70	35105	314	210	130	0.78	41231	317	256	43.0
3	2 *	132	1.05	48095	364	384	150	1.20	44075	294	353	6.7
3	9 *	101	1.25	32042	317	396	115	1.40	35184	306	435	24.7
3	10 +	141	0.85	52169	370	316	149	0.90	51688	347	314	3.2
4	3 +	134	1.10	56774	424	465	152	1.25	57187	380	474	3.4
4	4 *	300	0.92	105470	352	323	390	1.20	108019	277	331	8.9
4	7 +	165	1.09	60410	366	400	176	1.16	65703	374	435	3.4
4	8 *	185	1.28	66118	357	472	198	1.37	68556	347	477	20.3

* = Fast high producing farms   + = Slow high producing farms

Table B.4

Stock and Production on Farms in Survey Group B in 1964/65 and 1965/66

Soil Group	Survey Farm Number	1964/65 season Cow numbers	Cows/acre	Butterfat	Butterfat/cow	Butterfat/acre	1965/66 season Cow numbers	Cows/acre	Butterfat	Butterfat/cow	Butterfat/acre	Percent increase 5 years
1	20+	75	0.39	21215	283	150	80	0.41	21604	270	112	-1.5
1	21*	72	0.51	22301	310	157	89	0.63	26398	296	186	1.8
1	22+	70	0.40	18597	266	106	75	0.43	20740	277	118	1.3
1	25+	65	0.48	11730	181	87	67	0.54	13599	203	101	-7.9
1	36+	60	0.40	18048	300	120	65	0.43	17951	277	119	0.5
1	37*	70	0.36	20341	291	104	75	0.38	22909	306	118	10.0
2	18*	110	0.73	33720	306	224	110	0.73	35907	326	239	0.9
2	19*	97	0.62	28349	270	182	105	0.67	30025	286	192	0.2
2	24+	72	0.60	18252	254	152	.72	0.60	19672	274	164	1.2
2	30+	53	0.46	11480	217	99	57	0.49	12767	224	110	-6.3
2	31+	80	0.57	18601	232	132	78	0.55	16114	207	114	-1.9
2	35+	67	0.35	17489	261	92	72	0.38	18858	262	99	-2.1
3	13*	70	0.88	21126	302	264	70	0.88	22813	326	285	1.7
3	16+	63	0.90	18273	290	261	63	0.90	17838	283	255	-0.8
3	27*	83	0.75	21194	256	193	78	0.71	23445	300	213	-3.2
3	32+	115	0.69	35507	309	213	95	0.57	30590	322	183	0.4
3	34+	115	0.55	34799	302	166	115	0.55	38758	338	186	0.0
4	14*	81	0.95	23515	290	277	97	1.14	28683	296	338	-3.9
4	15+	85	0.90	19897	234	212	67	0.71	19043	285	203	-0.1
4	17+	78	0.89	19677	252	224	Out of production					1.5
4	23+	110	0.71	28376	258	183	115	0.74	36493	318	236	-0.5
4	26*	81	0.84	27167	335	280	73	0.75	27304	375	282	-1.1
4	28+	88	0.79	29047	330	259	93	0.83	23867	257	213	-0.2
4	29+	160	0.72	39671	248	179	160	0.72	46351	290	210	-5.3
4	33*	221	1.10	51100	231	256	235	1.17	52542	223	263	-4.2

* = Progressive low producing farms + = Static low producing farms

Table B.5 Wintering Method and Supplementary Feed Used on Farms in Survey Group A

Survey Farm Number	Method of wintering	Type and approximate amount of supplementary feed used per cow		
		Hay bales/ cow	Silage tons/ cow	Crop tons/ cow
2 *	Break of grass on	20	1.3	Nil
3 +		17	0.8	Nil
6 *	run-off plus hay or	27	Nil	1 Turnips S
7 +		12	0.7	Nil
8 *	silage	35	1.5	Nil
9 *		10	2.0	Nil
4 *	Break graze run-off then platform silage	10	0.7	Nil
11 *	Block grazing	20L	0.5L	Nil
1 +	Split wintering with	Nil	2.5	Nil
5 *		15	Nil	Nil
10 +	hay or silage or	15	0.9	Nil
12 *		27L	0.4L	1.3 Turnips S) 1.3 Swedes W)
	crop			

Notes: L = supplementary feed made partly from lucerne
W = crop used for winter feed
S = crop used for summer feed
Average crop yeilds taken as:
Silage = 8 tons per acre
Swedes = 30 tons per acre
Soft turnips = 25 tons per acre
* = Fast high producing farms
+ = Slow high producing farms

Table B.6 Wintering Method and Supplementary Feed Used on Farms in Survey Group B

Survey Farm Number	Method of wintering	Type and approximate amount of supplementary feed used per cow: Hay bales/cow	Silage tons/cow	Crop tons/cow
13 *	Mob stocked	20	1.1	Nil
14 *		18	Nil	Nil
20 +		35L	2.0	Nil
21 *		35L	Nil	1.2 Swedes W
22 +	and	28L	1.0	1.3 Turnips S
24 +		25L	Nil	(1.3 Turnips S (1.5 Chou Moellier W
25 +		25	Occasion	Nil
26 *	rotated around	25	1.0	Nil
33 *		20	0.6	Nil
34 +	the	22	2.0	Nil
35 +		38	Occasion	(2.0 Turnips W (2.0 Turnips S
36 +	farm	25L	Occasion	Nil
18 *	Mobbed	32L	Nil	Nil
19 *		30L	Occasion	(1.2 Turnips S (1.5 Swedes W
27 *		25	0.7	Nil
28 +		20	1.4	(Often (1.0 Turnips S
29 +	and	15	1.5	Nil
30 +		25	3.0	Nil
31 +		24	Nil	2.0 Turnips W
32 +		30	1.5	6.0 Chou Moellier W
37 *	setstocked	27L	1.6	Nil
15 +	Split	17	Nil	Nil
16 +	wintering	35	Nil	Nil

Notes: L = supplementary feed made partly from lucerne
W = crop used for winter feed
S = crop used for summer feed
Average crop yields taken as:
Silage = 8 tons per acre
Swedes = 30 tons per acre
Chou moellier = 30 tons per acre
Soft turnips = 25 tons per acre
* = Progressive low producing farms
+ = Static low producing farms

B.4 Capital

The following assumptions have been made in assessing the capital situation on the survey farms:

(i) Land and buildings have been taken at government valuation.[1/] This method of assessing the value of land and buildings meant that where a farmer was leasing part or all of his farm, this has been included as his personal asset free of debt. This was the case on farms 6, 14 and 36. The farmers true equity has been given as a footnote for these farms. This method of assessing the value of the farmers' land and buildings was necessary if meaningful comparative figures for total capital invested per cow and per acre were to be obtained.

(ii) Plant and equipment have been taken at book value, since a valuation of these assets would have been expensive.

(iii) Stock. Pigs have been entered at standard value because in most sets of accounts the classes of stock were not shown, and hence the author was unable to revalue them at market values. Cattle have been valued at the market value for each class of stock.[2/]

---

1. The book value of land and buildings in the farmers accounts were extremely unrealistic because of the varying purchase dates and the way they had been depreciated.

2. Market values for stock in May 1965 were obtained from the New Zealand Dairy Producers and Marketing Board, Pers.Comm.

Class of stock	Price $
Dairy cows	80
Heifers	74
Heifer calves	42
Bulls	80

(iv) Shares, bank balance and debtors have been taken direct from the balance sheet in the farmers accounts.

(v) Total assets represent the sum of the value of the land and buildings, plant and equipment, stock, and shares bank balance and debtors.

(vi) Total liabilities have been assessed from the balance sheet in the farmers accounts - this includes mortgages as well as current liabilities.

(vii) Equity has been calculated as a percentage as follows:

$$\text{Equity} = \left(\frac{\text{Total assets - Total liabilities}}{\text{Total assets}}\right) \times 100$$

(viii) The value of run-offs has not been included. In some cases run-offs were owned by the farmer and in other cases they were leased. In many cases on leased properties the value of the land was unavailable because of complicated Maori leases. The area of run-offs associated with each farm is shown in the capital tables.[3/]

(ix) The cow numbers given are for January 1965.

Tables B.7 and B.8 respectively show the capital situation on the farms in Survey Groups A and B.

---

3. Since run-offs have been ignored the capital figures in Tables B.7 and B.8 may underestimate the actual capital invested per cow or lb of butterfat.

Table B.7

Capital Situation on Farms in Survey Group A at Balance Date 1965

Soil Group	Survey Farm Number	$ Capital invested in land & bldgs.	plant & eqpt.	stock	shares bank bal. debtors	Total assets	Total liabi-lities	Equity	Area acres	Run-off acres	Cow nos.	Total capital invested per acre	Total capital invested per cow
1 & 2	12 *	36800	2780	18474	7934	65988	23302	64.6	350	N.A.	172	188.4	383.4
2	1 +	49800	6316	17970	2030	76116	23750	68.8	186	N.A.	169	409.2	450.4
2	5 *	21900	1842	11224	1972	36938	17672	52.2	105	N.A.	90	351.8	410.4
2	6 *	27100	4468	11494	2984	46010	19692	57.2**	147	22	114	313.0	403.6
2	11 *	21770	4546	11956	1984	40256	21936	45.5	161	50	110	250.0	366.0
3	2 *	35928	3338	17588	4448	61302	22428	63.4	125	84	132	490.4	464.4
3	9 *	23200	3146	10560	3540	40446	24190	40.2	81	59	101	499.4	400.4
3	10 +	41480	5268	15310	3798	65856	13828	79.0	165	N.A.	141	399.2	467.0
4	3 +	27460	2072	16858	2500	48890	25930	47.0	122	50	134	401.0	365.0
4	4 *	54700	6684	35700	1100	98184	39994	59.3	327	53	300	300.2	327.2

Notes: ** The farmers true equity was 28% 'N.A.' indicates 'not applicable'

* = Fast high producing farms + = Slow high producing farms

Table B.8

Capital Situation on Farms in Survey Group B at Balance Date 1965

Soil Group	Survey Farm Number	$ Capital invested in: land & bldgs.	plant & eqpt.	stock	shares bank bal. debtors	Total assets	Total liabi-lities	Equity	Area acres	Run-off acres	Cow nos.	Total capital invested per acre	Total capital invested per cow
1	20+	23710	2528	7938	3284	37460	20318	45.8	140	N.A.	75	267.6	499.4
1	21 *	18400	3029	8072	3064	32564	1872	94.2	142	N.A.	72	229.4	452.2
1	25+	15400	2220	7158	874	25652	4976	80.6	135	N.A.	65	190.0	394.8
1	36+	17900	2334	9030	594	29858	8502	71.0**	150	50	60	199.4	498.0
1	37 *	20000	2098	9044	1134	32276	16664	48.4	195	N.A.	70	165.6	461.0
2	18 *	15960	4122	13100	6364	39546	13228	66.6	150	30	110	263.6	359.6
2	19 *	19730	5494	12538	5706	43468	9490	78.2	156	21	97	278.6	448.2
2	30+	15500	1520	6142	1034	24196	16448	31.9	116	N.A.	53	208.4	456.2
2	31 +	26680	2814	9120	286	38900	5832	85.0	141	N.A.	80	276.0	487.0
2	35 +	21230	3162	9160	874	34426	8506	75.3	190	40	67	181.4	514.0
3	16 +	21110	730	6480	396	28716	5342	81.4	70	N.A.	63	410.0	455.8
3	27 *	21982	1204	8378	1122	32686	22858	30.0	110	N.A.	83	297.0	394.0
3	32 +	28350	3228	13306	432	45316	5392	S	167	N.A.	115	271.2	394.8
3	34 +	38900	2202	9974	4026	55102	20790	62.3	209	N.A.	115	263.6	479.2
4	14 *	19760	10448	8760	552	39520	8904	77.5++	85	30	18	465.0	488.0
4	26 *	27000	2084	8706	2844	40634	15168	62.7	97	N.A.	81	419.0	502.0
4	29 +	52200	5274	16410	1594	75748	36926	51.1	221	N.A.	160	341.6	471.8

Notes:

** Farmers true equity = 30.0%
++ Farmers true equity = 55.0%
'N.A.' indicates 'not applicable'
* = Progressive low producing farms
+ = Static low producing farms

S - Farm 32 was run on a 50 per cent sharemilking basis until June 1966. The milker owned everything except the land and buildings. He has since purchased the whole farm and increased his liabilities by $20,000. No equity figure has been calculated because of these complications.

APPENDIX C

COST OF USING BULK TOPDRESSING

This appendix compares the cost of bagged fertilizer railed to Edgecumbe and delivered to the farm gate with the application of bulk fertilizer applied by two different contractors operating on the Rangitaiki Plains.

Costs used were those current in February 1966[1] and have been calculated for applying 30 per cent potassic superphosphate at 4 cwt per acre.

Case 1

Consider a farm 3 miles on the Tauranga (north west) side of Edgecumbe. Costs for this farm are shown in Table C.1.

Table C.1 Fertilizer Costs for a Farm 3 Miles Northwest of Edgecumbe

Method of purchase	Fertilizer $	Cartage $	Application $	Total cost per ton $
Bagged fertilizer	28.05	4.13	N.A.	32.18
Bulk contractor 1	25.55	3.55	3.50	32.60
Bulk contractor 2	25.55	4.45	3.25	33.25

'N.A.' indicates 'not available'

1. Costs were obtained by Pers.Comm. with the contractors.

Case 2

Consider a farm 3 miles on the south-east side of Edgecumbe. Costs are shown in Table C.2.

Table C.2 Fertiliser Costs for a Farm 3 Miles Southeast of Edgecumbe

Method of purchase	Fertiliser ₡	Cartage ₡	Application ₡	Total cost per ton ₡
Bagged fertiliser	28.05	4.13	N.A.	32.18
Bulk contractor 1	25.55	4.00	3.50	33.60
Bulk contractor 2	25.55	4.45	3.25	33.25
'N.A.' indicates 'not available'				

There is an average difference of ₡0.70 per ton between bulk fertiliser spread on the farm and bagged fertiliser delivered at the farm gate. This ₡0.70 has to cover storage on the farm, labour, machinery, and fuel for spreading. Even if the labour would be idle if not used for applying fertiliser, it would still be cheaper for the farmer to use bulk lorry.

The conditions of the service available can be obtained from the individual contractors operating in the area, but they are designed to meet the needs of the farmer.

APPENDIX D

PRICE INDEX FOR INPUTS ON NEW ZEALAND DAIRY FARMS

The information for this index was obtained by the author during a personal interview at the New Zealand Dairy Production and Marketing Board.

The following comments on the calculation of these indices are from a draft copy of a paper prepared by the New Zealand Dairy Production and Marketing Board, "Index of Prices Paid by Dairy Farmers".

> "The prices of a range of items covering goods and services used by dairy farmers are ascertained generally in May of each year. The information is collected from merchants and other sources in all dairying regions, according to the relative importance of dairying, mostly through the Board's consulting officers and this is brought together in Wellington along with data collected centrally some of which is provided through the courtesy of the Government Statistician.
>
> The weighting of the items within the total index is in accordance with the pattern of expenditure shown in the Government Statistician's latest published 'Survey on Dairy Farmers' Incomes', which, however, has been broken down into additional sub-groups on the basis of information available to the Board from other sources."

This index was based at 1000 in 1949. The figures supplied by the New Zealand Dairy Production and Marketing Board have been converted to a 1966 basis of 1000 in order for everything to be expressed in terms of current prices for use in this survey. Table D.1 shows the index figures used in this survey.

Table D.1 Price Index for Inputs on New Zealand Dairy Farms

Item	1960	1961	1962	1963	1964	1965	1966
Contractors	994	994	984	995	971	996	1000
Repairs and maintenance	905	920	932	955	951	980	1000
Manure and seed	980	993	982	964	979	983	1000
Rates	714	731	769	814	881	946	1000
Electric power	1023	1000	998	997	999	1000	1000
Car and tractor	907	908	911	943	934	973	1000
Rail and cartage	921	917	917	936	939	986	1000
Depreciation	874	901	924	937	956	976	1000
Stock food and veterinary	925	959	1001	996	1018	987	1000
Insurance	968	1012	1012	1012	1008	1000	1000
Travel	893	896	918	919	939	993	1000
Other	898	955	982	996	996	1000	1000
Wages	925	957	967	969	971	989	1000
Rent	923	910	942	1020	974	993	1000
Interest	881	890	914	947	967	969	1000
All groups	911	932	945	957	964	980	1000

APPENDIX E

PROFITABILITY OF DEVELOPMENT

This appendix presents the five case farm studies of profitability of development referred to and summarised in Chapter 6.

The original situation of each farm is discussed. The development programme is outlined and the resulting final situation is shown. In each case future possible development is discussed before showing the profitability of the past development programme. At the end of this appendix summarised budgets are presented for each case farm.

E.1 Case Farm I (Survey Farm 11)

E.1.1 The farm

This farm of 161 acres is situated in Galatea; the soil type is mainly Horomanga sand, (Soil Group 2 of this survey). The farm has a gentle even slope from front to back which facilitates the drainage required in some parts due to seepage from the hills surfacing through springs on the farm.

The farmer purchased this property in June 1962, when he also obtained grazing rights on a 50-acre Maori property about 12 miles away. This run off is rented on a 6-monthly basis with a reasonable degree of certainty of renewal.

E.1.2 Original condition

At the time of purchase the farm was generally in a run-down condition. It had a lot of long rough poor quality grass. The milking shed, a 4-doubled-up walk through type, was in mediocre condition. The house was average. Fences were in need of repairs, and the farm was only subdivided into 19 paddocks varying in size from 3.5 to 24.8 acres. The farm was carrying 92 cows (0.57 cows per acre) which produced 23,000 lb butterfat which is equivalent to 143 lb butterfat per acre and 250 lb butterfat per cow.

E.1.3 Development programme

When this property was purchased the farmer stretched his capital to the utmost and borrowed the maximum allowable loan of $20,000 from the State Advances Corporation. Equity was low, and it was necessary to make a very careful assessment of the farm's potential and the development needed to reach it.

Due to the lack of working capital development had to proceed first with items that gave the greatest possible return. It was also decided that hard work could substitute for convenience and family luxury for a few years. The main policy decided on was a high stocking rate. Stock, manure and pasture improvement have gone together each year and were the main development steps for the first few years. Later, a large capital input in fencing, water reticulation, milking shed and extra labour was added.

Table E.11 Summary of Development on Case Farm I (161 acres)

Item	Base year	1963/4	1964/5	1965/6	1966/7	1967/8	New equilibrium
January cow numbers	92	91	107	130	150	200	200
Total production lb	22977	21950	31076	40956	46000	56000	60000
Butterfat/cow lb	250	242	290	315	307	270	300
Butterfat/acre lb	143	137	193	254	286	348	373
Calves	25	32	30	30	52	54	54
Yearlings	22	20	26	26	28	48	48
Cull cow sales	18	29	2	3	2	22	40
Pig income $	290	948	2860	1634	Nil	Nil	Nil
Hay bales	2300	2300	2700	3200	4200	3600	3600
Silage tons	Nil	Nil	70	110	70	80	80
Area lucerne	Nil	8.5	8.5	16.0	16.0	16.0	16.0
Fertilizer cwt/acre	2.5	2.5	5.0	5.0	5.0	6.0	6.0
Calving date	1 July	1 July	1 July	1 July	10 July	27 July	27 July
$ Development expenditure							
fences & races	Nil	Nil	Nil	Nil	1400	Nil	Nil
water supply	Nil	Nil	Nil	Nil	600	Nil	Nil
buildings	Nil	852	Nil	838	9600	600	Nil

Table E.11 gives a summary of each year's development progress as well as the stock carried and production attained. This table was calculated on an accounting year basis, and not on a dairying season, because figures had to be obtained from the farmer's accounts.

In the first season 92 cows were milked, this was higher than previous stocking rates on the property. Little else was done at this stage as the farmer was just getting used to the farm and measuring up its potential.

E.1.3,1 Pasture improvement

The means used for pasture improvement have been:

(i) Fertilizer - 30 per cent potassic superphosphate in spring and 15 per cent potassic superphosphate in autumn, applied at the rate of 2.5 cwt /acre at each dressing. This has now been increased to 3.0 cwt/ acre at each dressing.

(ii) Consolidation - the farmer attaches great importance to consolidation on this soil type. New lucerne paddocks are carefully rolled before sowing. One of the values the farmer sees in block grazing is consolidation.

(iii) Full utilization of all pasture grown - the farmer sees this as important in encouraging good species of pasture plants.

In the first year the pastures showed little response to the fertilizer, mainly, the farmer believes, because the pasture species were very poor and run out. In 1964/65 pastures commenced to improve and by the 1965/66 season pasture production was well in excess of stock requirements even though the stocking rate was being increased. Also, at this stage pastures were staying green through the summer and continuing to grow during the winter. This was the result of the change in species from browntop type pastures to ryegrass-white clover species. No oversowing or regrassing was done, the better species just came in themselves after manuring and good pasture management.

As an insurance 8.5 acres of lucerne were sown in 1963 and another 7.5 acres in 1965.

E.1.3,2 Grazing management

Lucerne provides grazing over the autumn and winter, as well as a cut of silage in October, and two cuts of hay over the summer.

Hay is made from young material (both lucerne and meadow) so that a good quality product is obtained.

A split herd wintering system was used in the early years of development but in 1966 block grazing was successfully used running about 100 cows per acre. It was found necessary to give the stock exercise in the last two weeks of pregnancy to avoid calving troubles.

In spring an electric fence is used as required. For the rest of the season a 12 hour grazing rotation has been used, but in future a more flexible pattern is to be introduced so that the stock clean out each paddock before moving on to the next. The emphasis is changing to making full utilisation, in situ, of all the feed grown.

E.1.3,3 Dairy stock

The sales of cull cows were exceptionally low. They were lower than would be expected in a normal herd. This was possible because in the first year on this farm a high percentage of the herd was young, and consequently they have lasted over the years. Every cow which still milks has been kept to raise the stock numbers. It will be some time before the herd settles down to a normal spread of age groups.

Although no culling has beenpossible artificial breeding has been used each year in order to gain as much genetic improvement in the herd as possible.

E.1.3,4 Calving date

The calving date was 1st July each year prior to 1966, when calving did not commence until 10th July. In 1967 calving did not commence until 27th July. In 1966 the later calving was primarily to give plenty of time for the building of the new cowshed. The continued later calving now is a result of a much higher stocking rate, and the farmer's realisation of the need to fully feed cows with fresh grass from calving onwards, rather than using large amounts of supplementary feed.

E.1.3,5 Pigs

The farmer believed that because of poor road access to Edgecumbe in 1963, the dairy factory policy would not change to whole milk collection in Galatea in the forseeable future. As the pig accounts showed that the profitability from skim milk was low the farmer decided to develop the piggery first. Six round farrowing houses were built in the winter of 1963. At the end of that year two weaner houses were built.

In 1965 the dairy factory policy changed to whole milk collection in Galatea. Due to the lack of labour on the farm, the farmer decided to change from pigs to whole milk collection in October 1965, after building a tankstand and modernising the milk room.

The increased pig returns (from a gross cash income of $290 in 1962/63 to $948, $2860 and $1634 in the subsequent years) suggests that the expenditure of $852 on piggeries was still a worthwhile investment even for 2.5 years.

E.1.3,6 Buildings and subdivision

In 1966 a new house, a 16-a-side herringbone cowshed and a hay barn were built as part of a crash development programme. Also, in this year the whole farm was re-laid out and subdivided into thirty, 4-acre paddocks, with water troughs in each paddock.

E.1.3,7 Labour

Prior to the 1966/67 season the farmer did all the farm work with family assistance. This meant hard work. In 1966 a good married man was employed. A high wage plus production bonus gives an income of about $3000 to the worker which is an attractive wage.

E.1.3,8 Drainage

A little open drainage has had to be done in order to increase the stock numbers from 150 to 200 cows.

E.1.3,9 Finance

Finance has been a limiting factor to the rate of development progress on this farm. The reason for the limited availability of medium or long-term finance has been that lending institutions have been dubious about the success of developing to such high levels of production in Galatea, particularly at the rapid rate of increase this farmer was attempting. A substantial bank overdraft has been maintained and a lot of development has been done out of revenue. A severe handicap resulted from the lack of finance to purchase another 50 cows in the 1966/67 season when all the other capital items needed to handle them had been added. This resulted in a lot of surplus feed, whereas good utilisation of the feed grown could have been made with extra stock.

E.1.4 Condition at the end of the development programme

At the end of the development programme this farm will be carrying 200 cows, that is, 1.25 cows per acre, plus replacements. The expected production is 60,000 lb butterfat, which is equivalent to 373 lb butterfat per acre and 300 lb butterfat per cow.

The calving date will be 27th July. The 50 acre run-off will be used for grazing heifers during the year, as well as for wintering some of the dairy stock. Wintering on the home farm will be done by block grazing and a little hay will be fed out at the end of winter and in the early spring. Conserved feed will be used at the rate of 15 to 18 bales of hay per cow plus a little lucerne silage. The grazing pattern throughout the year will be flexible and each paddock will be well grazed before moving onto the next. Fertilizer will be applied by farm spinner in split dressings at the rate of 6 cwt of potassic superphosphate per acre per year. The labour force consists of the farmer and a married man.

The development improvements have reduced the amount of work done by the farmer and his family and, consequently, have made the business much more congenial.

E.1.6 Profitability of development

Tables E.12 and E.13 show the results of the calculations for profitability of development on Case Farm I. These tables show that the reward to the owner increased by $5,807.6 per annum in the post-tax situation.

When the personal drawings during development were set at a minimum of the base year level, the pre-tax return on investment was 168.4 per cent and the post-tax return on investment was 86.3 per cent.

This shows a very high return for the capital invested. Very few other enterprises would return 168.4 per cent on invested capital with such security. Government shares with similar security would return about 4 per cent. The maximum overdraft rose to $6,086.6 in the fourth year of development. The payback period was 6 years. The present value of the pre-tax added total cash profits was $135,306.0 and the present value of the post-tax added total cash profits was $69,379.2. This is a very high return.

When the reward to owner during development was reduced from that of the base year level to a minimum of $2,000 the development programme proceeded with a lower maximum overdraft but with the same payback period. In this case the maximum overdraft was $5,331.4 and the payback period was again 6 years. The present value of the pre-tax added total cash profits was then $135,523.0 and the post-tax added total cash profits was $69,478.8.

This later situation of personal drawings falling to $2,000 could only apply if personal requirements were low and previous mortgage commitments were on easy repayment terms.

The development programme has been shown to be highly profitable to the farmer. This indicates that the profitability of development to high levels of production on a run-down dairy farm

Table E.12

The Profitability of Development - Case Farm I
Reward to Owner Set at a Minimum of the Base Year Level

	Base year	1963/4	1964/5	1965/6	1966/7	1967/8	1968/9	New equilibrium
Income								
Gross cash income	8146.4	9055.6	12584.6	17117.0	17313.8	21932.6	24177.0	24177.0
Additional cash income	N.A.	909.2	4438.2	8970.6	9167.4	13786.2	16030.6	16030.6
Expenditure								
Tax deductible cash expenditure	5216.6	6339.4	8024.6	7623.8	10618.0	15547.0	10619.4	10382.0
Non-tax deductible cash expenditure	Nil	1294.0	1638.0	1714.0	9600.0	600.0	Nil	Nil
Depreciation	828.2	970.8	784.8	1244.0	3452.0	1665.0	1545.0	1545.0
Taxation								
Taxable income	2101.6	1745.4	3775.0	8249.0	3243.8	4702.4	12012.4	12250.0
Total tax paid	174.6	115.2	582.6	2557.2	427.2	902.8	5071.6	5232.0
Cash Statement								
Reward to owner	2755.0	2755.0	2755.0	3357.6	2755.0	2755.0	4526.4	8562.8
Annual overdraft	Nil	1448.2	415.8	Nil	6086.6	Nil	Nil	Nil
Cumulative overdraft	Nil	1448.2	1864.2	Nil	6086.6	3959.2	Nil	Nil
Interest	Nil	Nil	86.8	111.8	Nil	365.0	237.4	Nil
Development Cash Profits								
Pre-tax added cash profits	N.A.	-1507.6	-7.8	4849.2	-5834.0	2855.6	10627.6	10865.2
Post-tax added cash profits	N.A.	-1448.2	-415.8	2466.6	-6086.6	2172.2	5730.4	5807.6

Note: 'N.A.' indicates 'not applicable'

Pre-tax Return on Investment = 168.4%
Post-tax Return on Investment = 86.3%
Maximum Overdraft = $6,086.6

Payback Period = 6 years
Present Value of Pre-tax Added Cash Profits = $135,306.0
Present Value of Post-tax Added Cash Profits= $ 69,379.2

Table E.13

The Profitability of Development - Case Farm I
Reward to Owner Set at a Minimum of $2000

	Base year	1963/4	1964/5	1965/6	1966/7	1967/8	1968/9	New equilibrium
Income								
Gross cash income	8146.5	9055.6	12584.6	17117.0	17313.8	21932.6	24177.0	24177.0
Additional cash income	N.A.	909.2	4438.2	8970.6	9167.4	13786.2	16030.6	16030.6
Expenditure								
Tax deductible cash expenditure	5216.6	6339.4	7979.2	7531.2	10618.0	15501.8	10527.2	10382.0
Non-tax deductible cash expenditure	Nil	1294.0	1638.0	1714.0	9600.0	600.0	Nil	Nil
Depreciation	828.2	970.8	784.8	1244.0	3452.0	1665.0	1545.0	1545.0
Taxation								
Taxable income	2101.6	1745.4	3820.4	8341.6	3243.8	4765.6	12104.6	12250.0
Total tax paid	174.6	115.2	592.8	2614.8	427.2	919.4	5134.0	5252.0
Cash Statement								
Reward to owner	2755.0	2000.0	2000.0	4933.8	2000.0	2000.0	6095.4	8562.8
Annual overdraft	Nil	693.0	Nil	Nil	5331.4	Nil	Nil	Nil
Cumulative overdraft	Nil	693.0	322.6	Nil	5331.4	2420.0	Nil	Nil
Interest	Nil	Nil	41.4	19.2	Nil	319.8	145.2	Nil
Development Cash Profits								
Pre-tax added cash profits	N.A.	-1507.6	37.4	4941.8	-5834.0	2900.8	10719.8	10865.2
Post-tax added cash profits	N.A.	-1448.2	-384.6	2501.4	-6086.6	2156.0	5760.4	5807.6

Note: 'N.A.' indicates 'not applicable'

Maximum Overdraft = $5,331.4
Payback Period = 6 years

Present Value of Pre-tax Added Cash Profits = $135,523.0
Present Value of Post-tax Added Cash Profits= $ 69,478.8

in Galatea, on the Horomanga sand soil type, should be very profitable to any farmer concerned, provided procedures similar to those outlined in Section E.13 are employed. In summary these were:

Year 1: The farmer established himself on the farm and evaluated its potential. He then set goals and planned development to accomplish this potential. Milked 92 cows.

Year 2: Milked 92 cows. Built piggery to improve the efficiency of the pig enterprise. Planted 8.5 acres of lucerne as an insurance against summer drought.

Year 3: Increased cow numbers by 16. Doubled the fertilizer rate to 5 cwt/acre of 30 per cent potassic superphosphate.

Year 4: Increased cow numbers to 130. Sold the pigs and changed to whole milk supply in October, after modernizing the milk room and building a tanker stand. Planted 7.5 acres of lucerne.

Year 5: Increased cow numbers to 150. Employed a married man. Built a new house, a 16-a-side Herringbone cowshed and a hayshed. Re-subdivided the farm and installed a new water reticulation scheme. The calving date was put back from the 1st to the 10th July.

<u>Year 6</u>: Increased cow numbers to 200. Increased fertilizer rate to 6 cwt/acre of potassic superphosphate. Changed the calving date to the 27th July. Built an implement shed.

E.2 Case Farm II (Survey Farm 5)

E.2.1 The farm

This farm of 105 acres is on the Rangitaiki Plains; the soil type is Onehu Sandy loam (Soil Group 2 of this survey).

The land is humpy in parts which makes drainage difficult.

The farmer purchased this property in 1960.

E.2.2 Original condition

When this farmer took over the property it had a new house, an 8-a-side Herringbone cowshed, and was subdivided into 7 paddocks with poor fences. It was stocked with a dairy herd of 65 cows (0.62 cows per acre), supplying whole milk, and approximately 250 lambs were fattened during the autumn. The production was 14,400 lb butterfat which is equivalent to 137 lb butterfat per acre and 237 lb butterfat per cow.

Pasture species were poor and included yarrow, browntop, yorkshire fog, and thick rushes on parts of the farm.

E.2.3 The development programme

When the farmer purchased the property he had very little capital, but had a strong desire to build up a highly profitable unit. In order to do this cows and fertilizer were chosen as the most productive items, and it was decided that other items could wait for a few years. Once the emphasis on stock and manure was started it was realized that complementary inputs of pasture improvement and renewal, subdivision, and drainage were required.

This farmer has made regular use of direct extension services to aid with the farm development.

The main features of the development programme are discussed below, and a summary of the annual steps in development is shown in Table E.21.

E.2.3.1 Pasture improvement

In each of the first three years of development a 9 acre summer crop of turnips was taken. This was partly to provide summer feed while the pastures were poor, and partly as a step in pasture improvement. The roughest paddocks were selected for cropping before being regrassed. In the fourth year of development, when a crop was not considered to be needed for summer feed, 13 acres of new grass were established after rotary hoeing the old pasture. The remaining pastures on the farm have been improved by using stock and fertilizer alone. Up to 15 cwt/acre of 30 per cent potassic superphosphate has been applied in one year to a pasture for improvement.

E.2.3.2 Fertilizer

The fertilizer used is 30 per cent potassic superphosphate, applied in two split dressings, by bulk lorry. The application rate has increased annually during development from 2.6 cwt/acre to 6.1 cwt/acre in the 1964/65 season. The farmer is aiming to apply 1 ton 30 per cent potassic superphosphate per 1000 lb butterfat produced.

Table E.21 Summary of Development on Case Farm II
(105 acres)

Item	Base year	1961/2	1962/3	1963/4	1964/5	New equilibrium
January cow numbers	65	86	90	81	89	104
Total production lb	14406	24345	23865	24085	30260	31512
Butterfat/cow lb	237	285	265	298	340	303
Butterfat/acre lb	137	237	227	233	295	300
Calves	22	11	25	25	28	28
Yearlings	17	22	11	25	25	25
Sheep	260	6	Nil	Nil	Nil	Nil
Hay bales	1200	2200	1500	2000	1900	2000
Turnips acres	9	9	9	Nil	Nil	Nil
New grass acres	9	9	9	13	Nil	Nil
Fertilizer cwt/acre	2.6	4.2	4.4	5.5	6.1	6.1
Calving date	15 July	10 July	18 July	24 July	7 Aug	10 Aug
Number paddocks	7	11	13	13	13	13
Outside grazing - No. head	18	25	Nil	25	25	Nil
Outside grazing - No. weeks	14	14	Nil	16	16	Nil

E.2.3,3 Grazing management

There has been little grazing management on this farm. Prior to 1964 stock used to spend 3 or 4 days in one paddock. Now with smaller paddocks the normal grazing time is 24 hours.

Wintering is done on a split herd basis on half the farm. Hay is used as required. The quantity of conserved feed saved and used per cow has remained almost constant during the development period at about 20 bales/cow. Given reasonable spring growth in August the farmer expects this to fall considerably with the later calving. Silage has not been made or used on this farm.

The only pasture saved for early calvers is that which grows over the winter.

Prior to 1966 the yearling heifers were grazed out for four months over the autumn - winter period. This was dictated by the feed situation.

E.2.3,4 Dairy stock

The herd is mainly Jersey-Friesian crossbreds. Stock were purchased in three of the development years in order to increase the herd size. There has been an emphasis, particularly in later years, on rearing as many calves as possible because of the cost of purchasing stock. The development programme started badly with only 11 heifers reared in 1961/62. This was partly because of the owner's health and family situation, and partly because of a heavy death rate among the calves.

E.2.3,5 Calving date

The calving date has been made progressively later each year in order to fit feed requirements to seasonal growth. In 1960 the calving date was 15th July and in 1965 it was the 10th August.

E.2.3,6 Buildings and subdivision

No buildings have been added during this development programme, but the farm has been subdivided from 7 to 13 paddocks with permanent five wire fences, and all except 13 chains of the original internal fencing has been renewed.

E.2.3,7 Labour

During the first three years of development some casual labour was employed for development work. Since 1964 a youth has been employed for half the year to help the owner with milking and other farm work.

E.2.3,8 Drainage

About $100 has been spent annually on drainage, mainly on deepening and cleaning existing drains.

E.2.3,9 Finance

The farm was purchased on a table mortgage from an insurance company.

It has been necessary to purchase stock in three years in order to increase the herd size. Stock purchases have required more finance than any other item in this development project. The non-tax deductible cash expenditure shown in Tables E.22 and E.23 was on cars. Finance has been obtained from a bank overdraft, stock firms and a private loan.

E.2.4 Condition at the end of the development programme

In 1965 the area of this farm was increased and thus the development programme considered here has been ended at this date. The figures given for 1965/66 are for a static post-development situation.

At the end of the development programme this farm was carrying 1 cow per acre and producing 31,512 lb butterfat, the equivalent of 300 lb butterfat per acre and 303 lb butterfat per cow. Stock are wintered on a split herd basis and hay is fed out as required. Hay is the only supplementary feed used, and is fed at the rate of 19 bales per cow per year.

The calving date is 10th August.

Thirty per cent potassic superphosphate is applied by bulk lorry in two split dressings, each of 3 cwt per acre.

The grazing pattern throughout the year is flexible, but generally amounts to 24 hour grazing. Each paddock is well grazed before proceeding to the next. This method was designed to make full use of all feed grown. The labour input consists of the owner, and a youth for about half the year.

E.2.5 Future possible development

This farmer considers the potential of this property much higher than that which has already been obtained, and development will continue. Future development will consist mainly of pasture improvement by regrassing and drainage, as well as increasing stock numbers.

E.2.7 Profitability of development

Tables E.22 and E.23 show the profitability of development on Case Farm II. From these tables it can be seen that the reward to the owner after development, net of tax, was increased by $1,463.2. This made his total reward equal to $5,584.2 per year.

When the reward to owner during development was set at a minimum of the base year level the pre-tax return on investment was 248.4 per cent and the post-tax return on investment was 129.0 per cent. These figures represent very high returns to invested capital. The maximum overdraft rose to $1,057.6 which was in the third year of development. The payback period was 5 years. The present value of the pre-tax added total cash profits was $36,564.0, and the present value of the post-tax added total cash profits was $18,987.0.

When the reward to owner during development was reduced from the level of the base year to a minimum of $2,000 no overdraft was needed for development. This meant that as well as the maximum overdraft being nil, the payback period was nil. The present value of the pre-tax added total cash profits was then $36,658.2, and the

Table E.22

The Profitability of Development - Case Farm II
Reward to Owner Set at a Minimum of the Base Year Level

	Base year	1961/2	1962/3	1963/4	1964/5	1965/6	New equilibrium
Income							
Gross cash income	7594.0	11623.2	9820.4	9803.6	12148.2	12787.2	12787.2
Additional cash income	N.A.	4029.2	2226.4	2209.6	4554.2	5193.2	5193.2
Expenditure							
Tax deductible cash expenditure	2737.2	6848.6	4891.8	3839.4	5930.2	5236.8	5218.4
Non-tax deductible cash expenditure	Nil	128.0	Nil	1308.0	Nil	Nil	Nil
Depreciation	610.4	352.8	343.6	305.4	362.8	362.8	362.8
Taxation							
Taxable income	4246.4	4421.8	4584.8	5658.6	5855.0	7187.4	7206.0
Total tax paid	735.8	796.2	853.8	1270.0	1353.2	1975.2	1984.4
Cash Statement							
Reward to owner	4120.8	4120.8	4120.8	4120.8	4120.8	5266.8	5584.2
Annual overdraft	Nil	270.4	46.2	734.8	Nil	Nil	Nil
Cumulative overdraft	Nil	270.4	316.8	1051.6	308.0	Nil	Nil
Interest	Nil	Nil	16.2	19.0	63.0	18.4	Nil
Development Cash Profits							
Pre-tax added cash profits	N.A.	-210.2	71.6	-200.6	1361.0	2693.4	2712.0
Post-tax added cash profits	N.A.	-270.4	-46.2	-734.8	743.6	1454.0	1463.2

Note: 'N.A.' indicates 'not applicable'

Pre-tax Return on Investment = 248.4%
Post-tax Return on Investment = 129.0%
Maximum Overdraft = $1,051.6

Payback Period = 5 years
Present Value of Pre-tax Added Cash Profits = $36,564.0
Present Value of Post-tax Added Cash Profits= $18,987.0

Table E.23

The Profitability of Development - Case Farm II
Reward to Owner Set at a Minimum of $2000

	Base year	1961/2	1962/3	1963/4	1964/5	New equilibrium
Income						
Gross cash income	7594.0	11623.2	9820.4	9803.6	12148.2	12787.2
Additional cash income	N.A.	4029.2	2226.4	2209.6	4554.2	5193.2
Expenditure						
Tax deductible cash expenditure	2737.2	6848.6	4875.6	3820.4	5876.2	5218.4
Non-tax deductible cash expenditure	Nil	128.0	Nil	1308.0	Nil	Nil
Depreciation	610.4	352.8	343.6	305.4	362.8	362.8
Taxation						
Taxable income	4246.4	4421.8	4601.2	5677.8	5918.2	7206.0
Total tax paid	735.6	796.2	859.6	1278.0	1380.6	1984.4
Cash Statement						
Reward to owner	4120.8	3850.2	4085.0	3397.0	4900.2	5584.2
Annual overdraft	Nil	Nil	Nil	Nil	Nil	Nil
Cumulative overdraft	Nil	Nil	Nil	Nil	Nil	Nil
Interest	Nil	Nil	Nil	Nil	Nil	Nil
Development Cash Profits						
Pre-tax added cash profits	N.A.	-210.2	88.0	-181.6	1424.2	2712.0
Post-tax added cash profits	N.A.	-270.4	-35.8	-723.8	779.2	1463.2

Note: 'N.A.' indicates 'not applicable'

Maximum Overdraft = Nil
Payback Period = Nil

Present Value of Pre-tax Added Cash Profits = $36,658.2
Present Value of Post-tax Added Cash Profits= $18,040.6

present value of the post-tax added cash profits was $19,040.6.

This development programme has also been shown to be highly profitable to the farmer. The final reward to the owner did not increase proportionally as much on this farm, as on Case Farm I. However, there was still a substantial increase. This farm was not developed to such a high level of productivity as Case Farm I. It will, however, be capable of producing at a similar level and future increases in production will probably increase the profitability considerably more.

Case Farm II shows that a low producing unit on Soil Group 2 on the Rangitaiki Plains can be raised to reasonable levels of production with a considerable increase in the reward to owner, in a short space of time.

The key features of this development programme in order of priority were:

(i) An emphasis on increasing stock numbers, and fertilizer application rate as fast as possible.

(ii) Complementary inputs of pasture renovation and renewal, subdivision and drainage were added as required. Cropping was used for some of the pasture renewal.

(iii) Calving date was made progressively later in order to fit cow requirements to grass growth.

(iv) Pasture management was very slack initially but is now being improved to assist with better feed utilization.

E.3 Case Farm III (Survey Farm 10)

E.3.1 The farm

This farm of 165 acres is on the Rangitaiki Plains; and the soil type is Omehu Loamy Sand with Tarawera Ash through it (Soil Group 3 of this survey). The land is level, but has a few coarse pumice ridges through it.

The farmer purchased 116 acres in 1956, and an adjacent 49 acres were purchased in 1960. The farm is owner operated.

E.3.2 Original condition

In 1960 the whole farm was generally in average condition. Buildings, which included a 4-doubled-up walk-through shed, two houses, and two hay barns, were in average condition. Fences were generally in need of repairs and the lay-out was poor. Pastures, all of which were over five years of age, contained a lot of paspalum. The farm was stocked with 128 cows (0.78 cows per acre) plus replacements and produced 46,000 lb butterfat, supplied as whole milk. This production is equivalent to 279 lb butterfat per acre and 359 lb butterfat per cow.

E.3.3 Development programme

The development on this farm has been slow and cautious and the resultant increase in production has been small. The farmers aim in development has been influenced considerably by his family situation. Increases in stock numbers have been on the conservative side each year so that the farmer is sure that he won't have to send any young stock out for grazing, and hence have to spend time away from the home farm.

The expenditure on this farm would be called "development" by many farmers however it is in no way "development" in the sense of the other case farms. Expenditure has been mainly on capital items which have improved the convenience and workability of the farm, but have done little toward increasing profitability.

The farmer has made regular use of a direct extension service.

The annual steps in the development programme are summarized in Table E.31 and the essential features are discussed below.

E.3.3.1 Pasture improvement

Except for 17 acres the pastures are over 10 years old. Some are poor and contain a lot of weeds, others are clover dominant. The 17 acres were ploughed in 1964 and a short term pasture of Italian ryegrass was sown, which was followed a year later with a mixture of Ariki ryegrass and white clover.

The regrassing was done because:

(i) The pasture had been badly damaged by Soldier fly;

(ii) Hedge removal had caused pasture damage;

(iii) The ground was very uneven;

(iv) The pasture was badly run-out.

The stock and fertilizer applied during development were inadequate for general pasture improvement.

Table E.31 Summary of Development on Case Farm III (165 acres)

Item	Base year	1961/2	1962/3	1963/4	1964/5	1965/6	New equilibrium
January cow numbers	128	139	134	125	141	149	150
Total production lb	45876	43846	48412	43397	51491	51909	52500
Butterfat/cow lb	358	315	361	347	365	348	350
Butterfat/acre lb	278	266	293	263	312	314	318
Calves	35	29	37	31	44	40	40
Yearlings	31	32	26	36	30	42	36
Cull cows	26	20	39	26	25	35	30
Heifers purchased	Nil	13	7	Nil	17	Nil	Nil
Calving date	7 July	7 July	7 July	7 July	7 July	14 July	20 July
Hay bales	3500	3500	4000	4000	3000	4700	5300
Silage tons	75	75	100	Nil	75	150	Nil
Fertilizer cwt/acre	3	3	3	3.5	4.5	4.5	4.5
Development expenditure \$							
roads & fences	Nil	164	Nil	600	1100	900	Nil
buildings	Nil	200	Nil	200	Nil	Nil	Nil
cowshed	Nil	800	Nil	300	Nil	Nil	Nil
water supply	Nil	150	Nil	600	Nil	160	Nil

E.3.3.2 Fertilizer

All fertilizer used is 30 per cent potassic superphosphate, most of which is applied in autumn by spinner topdresser. Prior to 1963 the rate was 3 cwt per acre all applied in autumn. Since then a spring topdressing of 1.5 cwt per acre has been introduced for the wintering area, and the autumn dressing over the whole farm has been increased to 3.5 cwt per acre.

E.3.3.3 Grazing management

At the commencement of the development programme wintering was done by mob stocking, however, this was changed, in 1964, to split wintering at the rate of 3 cows per acre. Due to pasture damage this was reduced to 2 cows per acre, and thus half the farm is used for wintering. The other half is shut up in March and fed off in April - May, and then shut again for spring feed. The area used for wintering is shut in April. Hay and silage are fed out as required over the winter. An electric fence is used in the early spring to ration feed, then a 12 hour grazing rotation is used.

Hay is the main conserved feed, although silage is made if the spring weather conditions prevent early haymaking. During the development period the quantity of hay used was reduced from about 30 to 20 bales per cow per year.

E.3.3,4 Dairy stock

The herd consists of all Jerseys. Artificial insemination has been widely used in the herd in order to try and improve the genetic merit. The increase in stock numbers was hampered by tuberculosis testing in 1963 which took an initial reactor rate of 25 per cent.

E.3.3,5 Calving date

Prior to 1964 the calving date was the 7th July, in 1966 it was the 20th July. This is still early calving, particularly for the pastures on this farm, however the farmer is unwilling to calve later because of a fear of summer droughts.

E.3.3,6 Buildings and subdivision

A 10-a-side Herringbone cowshed was built in 1961 as a conversion from the walk-through shed. An extra hayshed was built in 1964 to increase hay storage capacity to 5,500 bales. Over the three years 1963/64 to 1965/66 most of the farm was re-subdivided to give 40 paddocks and a central race system so as to improve the workability of the property. A lot of the subdivision has been done with permanent two wire electric fences.

E.3.3,7 Labour

In the initial stages of this programme the labour force consisted of the owner and a married man. In the 1964/65 season and subsequently a V.F.M. student has been employed for 6 months a year. To handle 150 cows this is a fairly high labour input, but it means that the labour force can have adequate time-off.

E.3.3.8 Water reticulation

With the re-subdivision of the farm the water reticulation scheme has been changed and improved. A large expenditure was made on this in the 1963/64 season. There is now a 0.75 inch main, and troughs in all paddocks.

E.3.3.9 Finance

Both parts of this farm were purchased on a vendor mortgage with a total repayment of $2,200 per year. This has meant a heavy drain on cash, which has hindered the rate of development. In 1965 when the total debt was reduced to $13,000 it was decided to refinance and to take a table mortgage with slower repayments.

E.3.4 Condition at the end of the development programme

At the end of this development programme this farm was running 150 cows and producing 52,500 lb butterfat. This is equivalent to 0.9 cows per acre, 350 lb butterfat per cow, and 318 lb butterfat per acre. The per cow production is high showing good individual cow treatment, however the per acre production is low.

The calving date is the 20th July.

There are 17 acres of new grass, but the remaining pastures are average or poor in quality.

Thirty per cent potassic superphosphate is applied at an average rate of 4.5 cwt per acre, most being used in autumn.

The grazing pattern over the summer-autumn period is a 12 hour rotation. Split wintering is used at the rate of 2 cows per acre. Hay is the main conserved feed, but some silage is used.

The labour input is high and consists of the owner, a married man, and a V.F.M. student for 6 months of the year.

E.3.5 Future possible development

The farmer considers that as more grass is grown by improving pasture species through regrassing, more stock will be carried. This farm should be capable of considerably more production per acre than at present. The author would suggest that the stock could be done a little harder without any adverse effect, and thus, even with the existing grass production, more stock could be carried.

E.3.6 Profitability of development

Tables E.32 and E.33 show the profitability of development on Case Farm III.

The reward to owner in the base year was high. This was $8,734.4. When the reward to owner during development was set at a minimum of the base year level, the programme was shown to be unprofitable. The extra return would never meet the debts incurred.

When the reward to owner during development was reduced to a minimum of $2,000 the post-tax added cash profits were increased by $296.2. The present value of the added cash profits was a negative

Table E.32

The Profitability of Development - Case Farm III
Reward to Owner Set at a Minimum of the Base Year Level

	Base year	1961/2	1962/3	1963/4	1964/5	1965/6	1966/7	1967/8	1968/9	New equilibrium
Income										
Gross cash income	18063.2	17156.2	19576.2	17196.8	20195.4	20927.6	20930.0	20930.0	20930.0	20930.0
Additional cash income	N.A.	-907.0	1113.0	-866.4	2132.2	2864.4	2866.8	2866.8	2866.8	2866.8
Expenditure										
Tax deductible cash expenditure	7054.8	8325.2	8831.4	9603.6	12334.8	11601.6	10425.0	10431.0	10437.2	10443.4
Non-tax deductible cash expenditure	Nil	1070.0	476.0	2560.0	2498.0	820.0	Nil	Nil	Nil	Nil
Depreciation	932.2	907.0	1233.8	1226.0	1106.6	1404.0	1250.0	1250.0	1250.0	1250.0
Taxation										
Taxable income	10076.2	7924.0	9510.8	6367.0	6753.8	7921.8	9254.8	9248.8	9242.6	9236.4
Total tax paid	2273.8	1296.2	1991.6	751.6	874.2	1295.4	1870.0	1867.2	1864.4	1861.4
Cash Statement										
Reward to owner	8734.4	8734.4	8734.4	8734.4	8734.4	8734.4	8734.4	8734.4	8734.4	8734.4
Annual overdraft	Nil	2269.8	457.6	4453.0	4246.0	1524.0	99.6	102.8	106.2	109.6
Cumulative overdraft	Nil	2269.8	2727.6	7180.6	11426.8	12951.0	13050.6	13153.6	13259.8	13369.4
Depredation	Nil	Nil	136.0	163.6	430.8	685.6	777.0	783.0	789.2	795.4
Development Cash Profits										
Pre-tax added cash profits	N.A.	-3247.4	-739.6	-5975.2	-5645.8	-2502.4	-503.4	-509.4	-515.6	-521.8
Post-tax added cash profits	N.A.	-2269.8	-457.6	-4453.0	-4246.0	-1524.0	- 99.6	-102.8	-106.2	-109.6

Note: 'N.A.' indicates 'not applicable'

Pre-tax Return on Investment = Infinite
Post-tax Return on Investment = Infinite
Maximum Overdraft = Infinite

Payback Period = Infinite
Present Value of Pre-tax Added Cash Profits =-Infinite
Present Value of Post-tax Added Cash Profits=-Infinite

Table E.33

The Profitability of Development - Case Farm III
Reward to Owner Set at a Minimum of $2000

	Base year	1961/2	1962/3	1963/4	1964/5	1965/6	New equilibrium
Income							
Gross cash income	18063.2	17156.2	19576.2	17196.8	20195.4	20927.6	20930.0
Additional cash income	N.A.	-907.0	1113.0	-866.4	2132.2	2864.4	2866.8
Expenditure							
Tax deductible cash expenditure	7054.8	8325.2	8695.4	9440.0	11904.0	10916.0	9648.0
Non-tax deductible cash expenditure	Nil	1050.0	476.0	2560.0	2498.0	820.0	Nil
Depreciation	932.2	907.0	1233.8	1226.0	1106.6	1404.0	1250.0
Taxation							
Taxable income	10076.2	7924.0	9647.0	6530.8	7184.8	8607.6	10032.0
Total tax paid	2273.8	1296.2	2058.0	802.4	1020.6	1578.6	2251.0
Cash Statement							
Reward to owner	8734.4	6464.6	8346.6	4394.2	4772.6	7612.8	9030.8
Annual overdraft	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Cumulative overdraft	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Interest	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Development Cash Profits							
Pre-tax added cash profits	N.A.	-3247.4	-603.6	-5811.6	-5215.0	-1816.8	273.6
Post-tax added cash profits	N.A.	-2269.8	-387.8	-4340.2	-3961.8	-1121.4	296.2

Note: 'N.A.' indicates 'not applicable'

Maximum Overdraft = Nil
Payback Period = Nil

Present Value of Pre-tax Added Cash Profits = $-10,561.2
Present Value of Post-tax Added Cash Profits = $ -6,416.8

figure for both the pre- and post-tax situations. This was because of the long time period before the added cash profits from development became positive, and because of their small total amount.

The author would suggest the following reasons for the unprofitable result of this development programme:

(i) Poor pastures were not improved.

(ii) The fertilizer application rate was low.

(iii) As a result of the above two factors and also because the farmer wanted to "do his cows well" the stocking rate was low, hence the low per acre production.

(iv) The mortgage repayment rate was high and hence prevented the availability of finance for rapid development.

(v) There was a large capital expenditure on non-productive capital items including subdivision, water reticulation, plant and machinery, and car.

(vi) The workability of the farm was improved and extra plant and machinery were added including a large new tractor, yet with little increase in stock numbers the labour input was increased.

Overall this programme was aimed more at increasing convenience than production. This was largely dictated by the farmers family situation, however it was in major contrast to the highly profitable programmes on Case Farms I, II and IV where convenience was sacrificed for a few years and increases in stock numbers were considered of utmost importance.

This case farm study has shown the need for carefully considering any development project before blindly proceeding. This is of particular importance when considering adding nonproductive capital items.

E.4 Case Farm IV (Pre-Survey Farm)

E.4.1 The farm

This farm of 185 acres is run in conjunction with a 20 acre run-off. The farm is on the Rangitaiki Plains; and the soil type is Paroa loam on peat (Soil Group 4 of this survey). The run-off is on sand country (Soil Group 1).

This farm has been managed by the present owner since 1961 when he purchased half of it from his father, the other half was purchased in 1966.

E.4.2 Original condition

When the present owner took over this property it was running a dairy herd of 125 cows producing 34,200 lb butterfat, supplied as whole milk. This was equivalent to 0.68 cows per acre, 274 lb butterfat per cow, and 185 lb butterfat per acre. A mob of 60-80 steers were also run to help control the feed.

There was a 6-doubled-up walk-through shed which was in reasonably good condition.

The farm was poorly laid out for dairying, and was subdivided into 32 paddocks. The pastures were badly root bound with paspalum. Serious attacks of army worm had taken most of the ryegrass out of the pasture.

Drainage was inadequate for high stocking rates, but improvements to this were hindered by the level of water in the main public drains, a situation which was changed in 1962 by the Greig's Road

Pumping Scheme.

Manure was applied at the rate of 3 cwt per acre of 30 per cent potassic superphosphate in autumn.

Labour consisted of the farmer and a youth, with some family assistance.

The conserved feed was mainly hay, but some silage was also used.

E.4.3 The development programme

The development on this farm has been largely attributed, by the farmer, to the encouragement he has received from the regular use of a direct extension service.

The development programme has been carefully guided by an extension officer. The basic emphasis in development has been to rapidly increase cow numbers, and thus to increase production. In order to do this a number of complementary inputs including, pasture improvement, drainage, subdivision, improved water reticulation and a new Herringbone cowshed have been added.

The development programme has involved a change in enterprises from dairy and beef to all dairying.

The annual steps in development are summarized in Table E.41 and the essential features are discussed below.

Table E.41 Summary of Development on Case Farm IV
(185 acres)

Item	Base year	1962/3	1963/4	1964/5	1965/6	New equilibrium
January cow numbers	125	135	145	192	215	215
Total production lb	34246	34408	50193	64944	60297	71000
Butterfat/cow lb	274	255	346	338	270	330
Butterfat/acre lb	185	186	271	350	325	384
Calves	33	30	35	78	58	58
Yearlings	30	30	40	32	75	52
Beef cattle	81	97	Nil	Nil	Nil	Nil
Hay bales	3500	3500	4100	5900	5600	6200
Silage acres	8	15	30	30	26	12
New grass acres	Nil	21	20	20	20	Nil
Fertilizer cwt/acre	3	3	4	4	6	6
Calving date	28 June	7 July	15 July	26 July	31 July	1 Aug
Development expenditure $						
water supply	Nil	Nil	260	380	768	Nil
drainage	Nil	900	860	600	28	Nil
subdivision	Nil	140	500	170	518	Nil
metal for race	Nil	Nil	140	460	660	Nil

E.4.3,1 Pasture improvement

Each year during development about 20 acres of pasture has been oversown with a mixture of ryegrass, white clover and praire grass. This has been required to improve poor pastures which were the result of understocking and bad management in past years. All pastures are being improved by the level of stocking and fertilizer applied.

E.4.3,2 Fertilizer

Only 30 per cent potassic superphosphate has been used. Prior to 1966 this was applied by farm spinner, but is now being applied by bulk lorry. In the base year and first year of development fertilizer was applied in one autumn dressing at the rate of 3 cwt per acre. This was increased to 4 cwt per acre in 1963/64. In 1964/65 two split dressings in autumn and spring were introduced. In 1965/66 the total application rate of fertilizer was increased to 6 cwt per acre.

Throughout the development period the run-off has been topdressed at the rate of 3-4 cwt per acre in autumn and 2 cwt per acre in November. The aim has been to build up fertility on the run-off so that most of the hay can be cut off it.

E.4.3,3 Grazing management

Wintering is done in two stages on this farm. During the first month the herd is mob-stocked on the run-off and given a break of grass each day, plus hay. After the run-off has been chewed out the stock are returned home and put on a sawdust pad where they are fed hay, and given a break of grass in fine weather. Springers are removed and fed pasture, silage and hay. The sawdust pad is used to prevent pugging damage to pastures.

The summer-autumn grazing rotation is 12 hours, in which time each paddock is well chewed out by 60 cows per acre. There is a strong emphasis on the full utilization of all pasture grown.

The conserved feed used per cow remained almost constant over the development period, at 26 bales of hay and 0.75 tons silage per cow. The author would expect that the amount of conserved feed could be reduced without adverse effects. By 1966 less silage was being made because as calving became later there was less surplus early spring feed. When a surplus did start to build up, the season was far enough advanced for hay to be made. (This largely depends on the 'lateness of the spring').

E.4.3,4 Stock

The steers were got rid of after the first year of development, as cow numbers started to increase.

The dairy stock are all Jerseys, and artificial insemination is widely used. Cow numbers rose by 10, 10, 47 and 23 in the respective development years. This is a substantial increase in stock numbers. In order to increase stock numbers 11, 32 and 43 in-calf heifers were purchased respectively in the first three years of development. There has also been an emphasis on rearing large numbers of heifer calves.

E.4.3,5 Calving date

The calving date which was the 28th June in the base year was made progressively later so that it was the 1st August at the end of the programme. The reason for later calving has been to better equate feed supplies with stock requirements.

E.4.3,6 Buildings and subdivision

In 1965 a new 18-a-side Herringbone cowshed with circular yard was built at a cost of $8,000. Subdivision has been done so as to increase the number of paddocks from 32 large paddocks, to 52, 3.5 acre paddocks. With this subdivision, some of which has been done in each year of development, the farm has been re-laid out with a central race system. During the last three years of development this new race has been metalled.

E.4.3,7 Labour

The labour force during the early part of development was the owner and a youth, with a little family assistance. In 1964 this was increased by adding a married man.

E.4.3,8 Drainage

The building of the Greigs Road Pumping Scheme in 1962 made it possible to properly drain this farm.

Expenditure was made on drainage, both in deepening existing open drains and digging new open drains, in each of the development years. The largest expenditure was in the early years of development. This made it possible for the stocking rate to be increased and other development to proceed.

E.4.3,9 Water supply

The new subdivision meant that expenditure had to be made in 1963 and 1964 on changing and increasing the internal reticulation scheme. In 1965 a new 4 inch main water supply line to the farm was installed, as well as increasing the internal reticulation. An 0.75 inch main is used around the farm, and there are troughs in each paddock.

E.4.3,10 Finance

The increased production on this farm required a large capital expenditure on stock and complementary inputs. Finance for development came from a stock company, a bank overdraft, and a mortgage with an insurance company. Budgets of future development as well as results of past development, when showed to the lending institutions were sufficient to gain all the finance required.

E.4.4 Condition at the end of the development programme

This development programme ends with this farm carrying 215 cows and producing 71,000 lb butterfat per year - the equivalent of 1.15 cows per acre, 384 lb butterfat per acre, and 330 lb butterfat per cow. The calving date is 1st August. Wintering is done mainly on the run-off where hay is fed out with a break of grass.

At the end of winter the stock are brought home and put on a sawdust pad prior to calving. They are allowed to graze paddocks in fine weather. Both hay and silage are used as supplementary feed at the rate of 26 bales of hay and 0.75 ton silage per cow per year. The grazing pattern throughout the year is a 12-hour rotation in which paddocks are generally well grazed. The labour input is the owner, a married man, a youth, and a little family assistance.

Although the initial emphasis in development on this farm was to increase stock numbers and production, development has considerably improved the workability of the property.

E.4.5 Future possible development

Farms on this soil type produced 485 lb butterfat per acre in 1964/65, so there is ample scope for increased production. The farmer realises this and future development will include regrassing, increasing stock numbers, and improving stock quality.

E.4.6 Profitability of development

Tables E.42 and E.43 show the profitability of development on Case Farm IV. It can be seen that the reward to owner net of tax was increased by $4,847.8, a 69 per cent increase.

When the reward to owner during development was set at a minimum of the base year level, which was $7,003.8 in this case, the pre-tax return on investment was 53.7 per cent and the post-tax return on investment was 23.3 per cent. The maximum overdraft was $16,221.4 and occurred in the fourth year of development. The payback period

Table E.42

The Profitability of Development - Case Farm IV
Reward to Owner Set at a Minimum of the Base Year Level

	Base year	1962/3	1963/4	1964/5	1965/6	1966/7	1967/8	1968/9	1969/70	New equilibrium
Income										
Grosscash income	16499.6	17506.0	19878.8	27799.6	25190.8	28767.4	28767.4	28767.4	28767.4	28767.4
Additional cash income	N.A.	1006.4	3379.2	11300.0	3691.2	12267.8	12267.8	12267.8	12267.8	12267.8
Expenditure										
Tax deductible cash expenditure	8387.6	9978.2	13941.6	16691.2	14134.4	11747.2	11475.2	11198.0	10915.4	10774.0
Non-tax deductible cash expenditure	Nil	4144.0	730.0	250.0	14520.0	Nil	Nil	Nil	Nil	Nil
Depreciation	684.0	1169.6	1115.0	1209.0	4292.0	1996.0	1996.0	1996.0	1996.0	1996.0
Taxation										
Taxable income	7428.0	6358.2	4822.0	9899.2	6764.2	15024.0	15296.0	15572.0	15855.8	15997.4
Total tax paid	1108.0	748.8	381.4	2183.6	877.4	5484.6	5668.2	5855.2	6046.0	6141.6
Cash Statement										
Reward to owner	7003.8	7003.8	7003.8	7003.8	7003.8	7003.8	7003.8	7003.8	9445.6	11851.6
Annual overdraft	Nil	4368.8	2178.2	Nil	11345.0	Nil	Nil	Nil	Nil	Nil
Cumulative overdraft	Nil	4368.8	6547.0	4876.2	16221.4	11689.8	7069.8	2359.8	Nil	Nil
Interest	Nil	Nil	262.0	392.8	292.4	973.2	701.2	424.0	141.4	Nil
Development Cash Profits										
Pre-tax added cash profits	N.A.	-4728.0	-2904.8	2746.2	-11575.6	8908.0	9180.0	9457.2	9739.8	9881.4
Post-tax added cash profits	N.A.	-4368.8	-2178.2	1670.8	-11345.0	4531.4	4619.8	4710.0	4801.8	4847.8

Note: 'N.A.' indicates 'not applicable'

Pre-tax Return on Investment = 53.7%
Post-tax Return on Investment = 23.3%
Maximum Overdraft = $16,221.4

Payback Period = 8 years
Present Value of Pre-tax Added Cash Profits = $114,948.0
Present Value of Post-tax Added Cash Profits= $ 49,838.2

Table E.43

The Profitability of Development - Case Farm IV
Reward to Owner Set at a Minimum of $2000

	Base year	1962/3	1963/4	1964/5	1965/6	1966/7	New equilibrium
Income							
Gross cash income	16499.6	17506.0	19878.8	27799.6	25190.8	28767.4	28767.4
Additional cash income	N.A.	1006.4	3379.2	11300.0	8691.2	12267.8	12267.8
Expenditure							
Tax deductible cash expenditure	8387.6	9978.2	13679.6	16298.4	13842.0	11142.8	10774.0
Non-tax deductible cash expenditure	Nil	4144.0	730.0	250.0	14520.0	Nil	Nil
Depreciation	684.0	1169.6	11115.0	1209.0	4292.0	1996.0	1996.0
Taxation							
Taxable income	7428.0	6358.2	5084.2	10292.2	7056.8	15628.4	15997.4
Total tax paid	1108.0	748.8	436.4	2386.2	976.2	5892.6	6141.6
Cash Statement							
Reward to owner	7003.8	2634.8	5032.6	8864.8	2000.0	5584.2	11851.6
Annual overdraft	Nil	Nil	Nil	Nil	6147.4	Nil	Nil
Cumulative overdraft	Nil	Nil	Nil	Nil	6147.4	Nil	Nil
Interest	Nil	Nil	Nil	Nil	Nil	368.8	Nil
Development Cash Profits							
Pre-tax added cash profits	N.A.	-4728.2	-2642.8	3139.2	-11283.2	9512.4	9881.4
Post-tax added cash profits	N.A.	-4368.8	-1971.0	1861.0	-11151.2	4728.0	4847.8

Note: 'N.A.' indicates 'not applicable'

Maximum Overdraft = $6,147.4
Payback Period = 1 year

Present Value of Pre-tax Added Cash Profits = $117,060.0
Present Value of Post-tax Added Cash Profits= $ 50,763.8

was 8 years. The present value of the pre-tax added cash profits was $114,948.0, and the present value of the post-tax added cash profits was $49,838.2.

When the reward to owner was set at a minimum of $2,000 during the development period the profitability was as follows. The maximum overdraft was $6,147.4 which was in the fourth year of development, and was repaid in 1 year. The present value of pre-tax added cash profits was $117,060.0 and the present value of post-tax added cash profits was $50,763.8.

This development programme has been shown to be highly profitable to both the farmer and the nation.

Case Farm IV is an example of the profitability of developing a low producing unit on the good soils (Group 4 of this survey) of the Rangitaiki Plains to reasonable levels of production. There is still ample scope for further development on this farm before production rises to levels comparable with the top producing herds in the district.

In summary this programme involved:

(i) A change of enterprises from dairy and beef to all dairy.

(ii) Large increases in dairy cow numbers, both by purchasing, and rearing extra stock. The final stocking rate was 1.15 cows per acre.

(iii) Improving pastures by oversowing.

(iv) Increasing fertilizer rate to a high level (6 cwt per acre).

(v) Calving later - 1st August.

(vi) Improving farm drainage.

(vii) Increasing subdivision and improving farm layout.

(viii) Improving the water reticulation scheme.

In this programme the initial aim was to increase stock numbers and production, however complementary inputs were added as required and the workability of the farm was greatly improved. The programme resulted in a highly profitable outcome. This is in marked contrast to the development programme on Case Farm III where the aims were in the opposite order and the programme proved unprofitable.

E.5 Case Farm V (Survey Farm 37)

E.5.1 The farm

This farm of 195 acres is situated in Galatea; the soil type is Galatea sand (Soil Group 1 of this survey). The farmer purchased the property in 1952.

E.5.2 Original condition

In 1961 the farm was subdivided into 15 paddocks, pastures contained a lot of paspalum and browntop, as well as better species such as cocksfoot, perennial ryegrass, and white clover. There were 10 acres of lucerne. The milking shed was a 4-doubled-up walk-through shed. The herd consisted of 55 Ayrshire cows producing 14,400 lb butterfat, which is equivalent to 0.28 cows per acre, 258 lb butterfat per cow, and 73 lb butterfat per acre. A pig enterprise of 6 sows was maintained and about 100 lambs were fattened over the autumn. Fertilizer was applied at the rate of 2 cwt/acre of straight superphosphate in spring. The labour force consisted of the farmer and family assistance.

E.5.3 Development programme

This farm has been run solely as a family affair. During the first nine years of ownership little progress was made. In 1960 the farmer decided to increase stock numbers and production. This was partly stimulated by a need for increased personal drawings for family requirements, and partly because of the encouragement provided by mass media extension methods, particularly farming journals.

The low initial production has been increased almost solely by the addition of stock to more fully utilize the existing resources on the farm. Enterprises were changed from a combination of dairy, pigs and lamb fattening, to straight whole milk production. This change was made mainly to release labour for milking extra cows which the farmer considered more profitable than the other enterprises.

The annual steps in development are summarized in Table E.51 and the essential features of the programme are discussed below.

E.5.3,1 Pasture improvement

No real attempt was made during development to improve pastures. Another 10 acres of lucerne was sown in 1965 in order to provide extra hay and summer feed.

E.5.3,2 Fertilizer

Prior to 1966 the fertilizer application rate was 2 cwt per acre, but in 1966 it was increased to 2.5 cwt per acre. Straight superphosphate is used, and is applied in one spring dressing by bulk lorry.

E.5.3,3 Grazing management

Wintering is done by mob stocking the herd on a large paddock of rough feed and hay and silage are fed out when required. Most of the year a 12 hour grazing rotation with night and day paddocks is

Table E.51 Summary of Development on Case Farm V (195 acres)

Item	Base year	1961/2	1962/3	1963/4	1964/5	1965/6	1966/7	New equilibrium
January cow numbers	55	60	65	70	70	75	82	82
Total production lb	14408	15893	17779	17795	20341	22909	25092	25092
Butterfat/cow lb	258	265	274	254	291	306	306	306
Butterfat/acre lb	73	82	91	91	104	118	129	129
Calves	15	26	18	27	21	22	22	22
Yearlings	13	13	23	18	27	21	20	20
Sheep income $	84	640	Nil	Nil	Nil	Nil	Nil	Nil
Pig income $	250	490	736	574	856	Nil	Nil	Nil

used. Pasture utilization is poor because of lax grazing. An electric fence is used in spring to overcome some of this wastage, but with less than 0.5 cows per acre considerable wastage is inevitable. The stock generally have to graze lucerne over the summer as the rest of the farm dries out.

The total amount of conserved feed used has remained constant over the development years at about 2000 bales of hay and 14 acres of silage per year.

E.5.3,4 Stock

The sheep were all sold in 1962, and the pigs were sold out in 1965.

The increases in cow numbers can be seen in Table E.51 - the rate was generally 5 extra per year. All stock increases have been by natural increase. Artificial insemination has only been used, on average, every second year during development.

The herd was tuberculosis tested in 1960 and the initial reactor rate was 25 per cent. The farmer has not purchased any stock since then because of the fear of bringing this, and other diseases back onto the farm.

E.5.3,5 Calving date

The calving date was held constant at the 10th July, which is early.

E.5.3,6 Buildings and subdivision

No additions or alterations were made to the buildings or subdivision during the development period except for the removal of the piggeries.

E.5.3,7 Labour

The labour input has remained constant as the farmer and some family assistance. The wages paid since 1963/64 were to the farmers wife.

E.5.3,8 Finance

No extra finance was required for this development programme as no stock or large capital items were purchased, except a car in 1964.

E.5.4 Condition at the end of the development programme

At the end of this development the farm was running 82 cows producing 25,092 lb butterfat, which is equivalent to 0.44 cows per acre, 306 lb butterfat per cow and 129 lb butterfat per acre. Management changed very little throughout the programme except that the pig and lamb fattening enterprises were dropped, and whole milk was supplied instead of cream. Fertilizer is applied at 2.5 cwt per acre of straight superphosphate in spring. There are 20 acres of lucerne. Wintering is done by mob stocking the herd on a large paddock at the back of the farm and feeding out hay and silage as required.

E.5.5 Future possible development

As the owner has no sons interested in farming, he does not consider it worthwhile developing the farm to any more than a one-man unit. The author considers the property easily capable of supporting two married men if a large-scale development programme were carried out. This would include a large increase in stock numbers, a Herringbone cowshed, another house and labour unit, fertilizer, pasture improvement, and subdivision.

The soil type on which this farm is situated was carrying stock producing up to 240 lb butterfat per acre in the 1964/65 season. This farm is still only producing 129 lb butterfat per acre, thus showing room for doubling production.

E.5.6 Profitability of development

Table E.52 shows the profitability of development on Case Farm V. The reward to owner increased by $2,457.8 per annum. During the development programme there was never any overdraft, even when the reward to owner was set at the base year level. Results have only been shown for the situation where the reward to owner during development was set at a minimum of the base year level, because when the reward to owner was set at a minimum of $2,000 the same results were obtained. As there was no overdraft the return on investment was infinite, and the payback period was nil years. The present value of the pre-tax added cash profits was $53,661.8 and the present value of the post-tax added cash profits was $34,785.8.

Table E.52

The Profitability of Development - Case Farm V
Reward to Owner Set at a Minimum of the Base Year Level

	Base year	1961/2	1962/3	1963/4	1964/5	1965/6	1966/7	New equilibrium
Income								
Gross cash income	5321.4	6326.4	6983.8	7313.4	7746.2	9186.6	9987.6	10079.6
Additional cash income	N.A.	1005.0	1662.4	1992.0	2424.8	3865.2	4666.2	4758.2
Expenditure								
Tax deductible cash expenditure	2361.8	2317.6	2001.2	2563.0	2972.0	3582.0	3330.0	3330.0
Non-tax deductible cash expenditure	Nil	Nil	Nil	1190.0	94.0	146.0	Nil	Nil
Depreciation	570.4	504.4	409.8	370.2	420.0	412.0	412.0	412.0
Taxation								
Taxable income	2389.2	3504.4	4572.8	4380.2	4354.2	5192.6	6245.6	6337.6
Total tax paid	235.0	500.2	849.4	781.8	772.8	1081.6	1525.2	1567.0
Cash Statement								
Reward to owner	2724.4	3508.4	4133.0	2778.4	3907.2	4376.8	5132.2	5182.4
Annual overdraft	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Cumulative overdraft	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Interest	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Development Cash Profits								
Pre-tax added cash profits	N.A.	1049.2	2023.0	600.8	1720.6	2499.0	3698.0	379.0
Post-tax added cash profits	N.A.	784.0	1408.4	53.8	1182.6	1652.4	2407.8	2457.8

Note: 'N.A.' indicates 'hot applicable'

Pre-tax Return on Investment = Infinite
Post-tax Return on Investment= Infinite
Maximum Overdraft = Nil

Payback Period = Nil
Present Value of Pre-tax Added Cash Profits = $53,661.8
Present Value of Post-tax Added Cash Profits= $34,785.8

This development programme has also proved highly profitable to the farmer concerned. The reward to owner, net of tax, has been almost doubled for very little extra work. This illustrates that farms on the poor soils in Galatea can be very profitably raised from low to medium levels of production, (in this case, from 73 to 129 lb butterfat per acre) by solely increasing cow numbers and more fully utilizing the feed grown and other existing resources.

E.6 Development Budgets

The following budgets are for the development on the 5 case farms presented in this appendix. All figures have been quoted after adjustment to the 1966 level.

Case Farm I

Tax Deductible Cash Expenditure

Item	Base year	1963/4	1964/5	1965/6	1966/7	1967/8	New equilibrium
Wages	1500.6	1071.0	1261.2	1334.0	3334.0	4334.0	4334.0
Contractors	50.2	204.0	229.0	414.0	414.0	414.0	414.0
Rates	127.8	147.6	152.2	144.0	144.0	144.0	144.0
Rent	176.4	160.2	157.0	256.0	256.0	256.0	256.0
Insurance	61.2	49.6	52.0	34.0	34.0	34.0	34.0
Repairs & maintenance	653.4	683.4	1532.6	1012.0	3012.0	1012.0	1012.0
Electric power	114.4	126.2	144.0	188.0	188.0	188.0	188.0
Tractor/car expenses	176.0	402.6	538.4	322.0	322.0	322.0	322.0
Freight & cartage	235.0	236.4	440.2	406.0	406.0	406.0	406.0
Seed & manure	715.8	727.2	590.0	1802.0	1320.0	1584.0	1584.0
Shed expenses, Feed, Hay baling, A.B., Veterinary, Herd testing	1275.2	1408.6	2687.0	1336.0	924.0	1624.0	1624.0
Sundry	130.6	162.6	154.0	264.0	264.0	264.0	264.0
In-calf heifers	Nil	960.0	Nil	Nil	Nil	4800.0	Nil
TOTAL ∅	5216.6	6339.4	7936.0	7512.0	10618.0	15182.0	10382.0

Non-tax Deductible Cash Expenditure

Buildings	Nil	852.0	Nil	838.0	9600.0	600.0	Nil
Plant & implements	Nil	442.0	1638.0	876.0	Nil	Nil	Nil
TOTAL ∅	Nil	1294.0	1638.0	1714.0	9600.0	600.0	Nil

Case Farm I continued

Depreciation

TOTAL ₡	828.2	970.8	784.8	1244.0	3452.0	1665.0	1545.0

Gross Cash Income

Pigs	290.0	948.0	2860.0	1634.0	Nil	Nil	Nil
Butterfat	6730.4	6429.6	9102.6	14727.0	16540.8	20136.6	21575.0
Produce used	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Dairy factory rebate	20.0	50.0	62.0	86.0	86.0	86.0	86.0
Fertilizer rebate	Nil	50.0	66.0	54.0	54.0	54.0	54.0
Cull cows	756.0	1218.0	84.0	126.0	84.0	924.0	1680.0
Potter bulls	50.0	50.0	50.0	50.0	134.0	92.0	142.0
Bobby calves	290.0	300.0	350.0	430.0	405.0	630.0	630.0
TOTAL ₡	8146.4	9055.6	12584.6	17117.0	17313.8	21932.6	24177.0

Case Farm II

Tax Deductible Cash Expenditure

Item	Base year	1961/2	1962/3	1963/4	1964/5	New equilibrium
Wages	261.2	153.0	485.0	224.6	832.6	832.6
Contractors	Nil	Nil	Nil	150.4	180.8	100.0
Rates	295.4	275.6	282.6	277.0	222.0	222.0
Insurance	57.4	39.6	47.4	73.4	80.0	80.0
Repairs & Maintenance	526.0	517.2	245.0	321.8	626.6	616.6
Electric power	78.0	146.2	122.4	120.2	162.0	162.0
Tractor/car expenses	363.4	588.4	1359.4	799.4	1099.6	1099.6
Freight & cartage	8.8	89.4	38.4	149.0	69.0	70.0
Seed & Manure	462.0	1071.2	529.0	1017.4	1104.8	1056.0
Shed expenses) Seed) Hay baling) A.B.) Veterinary) Herd testing)	435.8	639.4	337.4	434.2	595.8	585.6
Sundry	249.2	256.6	261.0	273.0	384.0	384.0
In-calf heifers	Nil	3072.0	864.0	Nil	Nil	Nil
Cows	Nil	Nil	204.0	Nil	510.0	Nil
Yearling bull	Nil	Nil	100.0	Nil	Nil	Nil
TOTAL $	2737.2	6848.6	4875.6	3820.4	5867.2	5218.4

Non-tax Deductible Cash Expenditure

Buildings	Nil	Nil	Nil	Nil	Nil	Nil
Plant and implements	Nil	128.0	Nil	1308.0	Nil	Nil
TOTAL $	Nil	128.0	Nil	1308.0	Nil	Nil

Case Farm II continued

Depreciation

TOTAL $	610.4	352.8	343.6	305.4	362.8	362.8

Gross Cash Income

Sheep	1008.0	74.0	Nil	Nil	Nil	Nil
Butterfat	4995.0	9047.2	8561.4	8660.6	10880.2	11331.2
Produce used	10.0	10.0	10.0	10.0	10.0	10.0
Dairy factory rebate	Nil	84.0	32.0	6.0	54.0	54.0
Fertilizer rebate	Nil	Nil	Nil	36.0	90.0	90.0
Cull cows	546.0	2058.0	882.0	756.0	714.0	882.0
Potter bulls	50.0	50.0	50.0	100.0	100.0	100.0
Bobby calves	205.0	300.0	285.0	235.0	300.0	320.0
Contracting	780.0	Nil	Nil	Nil	Nil	Nil
TOTAL $	7594.0	11623.2	9820.4	9803.6	12148.2	12787.2

Case Farm III

Tax Deductible Cash Expenditure

Item	Base year	1961/2	1962/3	1963/4	1964/5	1965/6	New equilibrium
Wages	2683.4	2666.0	2840.0	3186.4	3644.8	4362.0	4362.0
Contractors	Nil	Nil	60.4	Nil	Nil	Nil	Nil
Rates	424.0	398.0	543.0	544.8	467.2	442.0	442.0
Insurance	45.4	55.4	110.6	71.4	70.0	554.0	554.0
Repairs & maintenance	954.4	1266.0	1149.8	2248.0	2594.0	1974.0	974.0
Electric power	192.0	206.4	208.6	194.2	210.0	220.0	220.0
Tractor/car expenses	427.4	334.8	515.4	411.2	528.2	490.0	490.0
Freight & cartage	24.0	4.4	25.6	Nil	56.8	32.0	32.0
Seed & manure	564.0	765.8	869.2	1428.0	1324.6	1546.0	1278.0
Shed expenses) Feed) Hay baling) A.B.) Veterinary) Herd testing)	1535.0	1124.8	1417.6	1062.8	1108.4	906.0	906.0
Sundry	205.2	254.6	283.2	293.2	268.0	390.0	390.0
In-calf heifers	Nil	1248.0	672.0	Nil	1632.0	Nil	Nil
TOTAL $	7054.8	8325.2	8695.4	9440.0	11904.0	10916.0	9648.0

Non-tax Deductible Cash Expenditure

Buildings	Nil	376.0	Nil	394.0	Nil	Nil	Nil
Plant & implements	Nil	694.0	476.0	2166.0	2498.0	820.0	Nil
TOTAL $	Nil	1070.0	476.0	2560.0	2498.0	820.0	Nil

Case Farm III continued

Depreciation

TOTAL $	932.2	907.0	1233.8	1226.0	1106.6	1404.0	1250.0

Gross Cash Income

Butterfat	16496.2	15766.2	17408.2	15604.8	18515.4	18665.5	18878.0
Produce used	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Dairy factory rebate	Nil	Nil	Nil	Nil	66.0	170.0	170.0
Fertilizer rebate	Nil	Nil	Nil	Nil	94.0	72.0	72.0
Cull cows	1092.0	840.0	1638.0	1092.0	1050.0	1470.0	1260.0
Potter bulls	50.0	100.0	100.0	100.0	Nil	100.0	100.0
Bobby calves	405.0	430.0	410.0	400.0	450.0	430.0	430.0
TOTAL $	18063.2	17156.2	19576.2	17196.8	20195.4	20927.6	20930.0

Case Farm IV

Tax Deductible Cash Expenditure

Item	Base year	1962/3	1963/4	1964/5	1965/6	New equilibrium
Wages	1654.6	1572.8	1466.6	2436.8	4154.0	4154.0
Contractors	Nil	168.8	22.6	Nil	30.0	30.0
Rates	637.2	656.0	631.2	615.2	424.0	424.0
Rent	424.6	221.6	437.4	465.2	134.0	134.0
Insurance	39.6	106.8	61.6	100.0	122.0	122.0
Repairs & maintenance	1907.8	1662.8	2275.4	2502.0	2564.0	1218.0
Electric power	112.2	138.4	176.2	270.0	196.0	196.0
Tractor/car expenses	1130.6	1597.0	1402.6	1401.8	1570.0	1570.0
Freight & cartage	30.6	21.4	10.6	77.0	10.0	10.0
Seed & manure	224.0	915.0	929.6	1440.4	1080.0	1040.0
Shed expenses) Feed) Hay baling) A.B.) Veterinary) Herd testing)	1502.4	1212.8	2000.0	2390.0	3178.0	1496.0
Sundry	545.8	496.0	473.8	472.0	380.0	380.0
Pump power & maintenance	178.2	104.8	Nil	Nil	Nil	Nil
In-calf heifers	Nil	1056.0	3072.0	4128.0	Nil	Nil
Heifer calves	Nil	48.0	720.0	Nil	Nil	Nil
TOTAL $	8387.6	9978.2	13679.6	16298.4	13842.0	10774.0

Non-tax Deductible Cash Expenditure

Buildings	Nil	990.0	Nil	Nil	6504.0	Nil
Plant & implements	Nil	3154.0	730.0	250.0	8016.0	Nil
TOTAL $	Nil	4144.0	730.0	250.0	14520.0	Nil

Case Farm IV continued

Depreciation

TOTAL ∅	684.0	1169.6	1115.0	1209.0	4292.0	1996.0

Gross Cash Income

Beef cattle	2732.0	1918.0	Nil	Nil	Nil	Nil
Butterfat	12254.6	13017.0	17023.8	24451.6	21681.8	25530.4
Produce used	30.0	30.0	30.0	30.0	20.0	20.0
Dairy factory rebate	Nil	Nil	Nil	160.0	Nil	Nil
Fertilizer rebate	Nil	Nil	Nil	Nil	48.0	48.0
Cull cows	1008.0	2016.0	1176.0	1344.0	2436.0	2184.0
Potter bulls	100.0	100.0	100.0	100.0	200.0	200.0
Bobby calves	375.0	425.0	455.0	550.0	805.0	785.0
Rent	Nil	Nil	614.0	496.0	Nil	Nil
Hay and grazing	Nil	Nil	480.0	668.0	Nil	Nil
TOTAL ∅	16499.6	17506.0	19878.8	27799.6	25190.8	28767.4

Case Farm V

Tax Deductible Cash Expenditure

Item	Base year	1961/2	1962/3	1963/4	1964/5	1965/6	1966/7	New equilibrium
Wages	Nil	Nil	Nil	86.6	440.8	448.0	448.0	448.0
Rates	93.0	148.2	145.0	145.2	141.6	136.0	136.0	136.0
Insurance	25.6	41.6	55.4	57.6	68.0	44.0	44.0	44.0
Repairs & maintenance	324.0	246.8	109.0	151.4	359.2	768.0	602.0	602.0
Electric power	96.0	102.2	110.4	108.2	112.0	202.0	202.0	202.0
Tractor/car expenses	489.0	450.0	303.2	554.6	532.4	366.0	366.0	366.0
Freight & cartage	4.4	63.2	38.4	Nil	12.2	24.0	24.0	24.0
Seed & manure	626.4	549.8	462.6	627.2	567.6	950.0	794.0	794.0
Shed expenses) Feed) Hay baling) A.B.) Veterinary) Herd testing)	565.2	579.4	636.6	693.6	630.2	448.0	518.0	518.0
Sundry	138.2	136.4	140.4	138.6	108.0	196.0	196.0	196.0
TOTAL $	2361.8	2317.6	2001.2	2563.0	2972.0	3582.0	3330.0	3330.0

Non-tax Deductible Cash Expenditure

Item	Base year	1961/2	1962/3	1963/4	1964/5	1965/6	1966/7	New equilibrium
Buildings	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Plant & implements	Nil	Nil	Nil	1190.0	94.0	146.0	Nil	Nil
TOTAL $	Nil	Nil	Nil	1190.0	94.0	146.0	Nil	Nil

Case Farm V continued

Depreciation

TOTAL $	570.4	504.4	409.8	370.2	420.0	412.0	412.0	412.0

Gross Cash Income

Pigs	250.0	490.0	736.0	574.0	856.0	Nil	Nil	Nil
Sheep	84.0	640.0	Nil	Nil	Nil	Nil	Nil	Nil
Butterfat	4220.2	4655.4	5207.8	5212.4	5958.2	8237.6	9022.6	9022.6
Produce used	Nil	Nil	Nil	20.0	20.0	Nil	Nil	Nil
Dairy factory rebate	30.0	24.0	24.0	32.0	32.0	34.0	28.0	28.0
Cull cows	462.0	252.0	420.0	630.0	630.0	630.0	672.0	714.0
Potter bulls	100.0	100.0	100.0	50.0	Nil	50.0	Nil	50.0
Bobby calves	175.0	165.0	240.0	195.0	250.0	235.0	265.0	265.0
Hay	Nil	Nil	256.0	600.0	Nil	Nil	Nil	Nil
TOTAL $	5321.4	6326.4	6983.8	7313.4	7746.2	9186.6	9987.6	10079.6

APPENDIX F

PROFITABILITY OF PROPOSED DEVELOPMENT

In this appendix 5 case studies are given to show the profitability of adding stock and employing labour plus other necessary inputs on farms in Survey Group B. These studies have been referred to in Sections 8.4, 8.5, and 8.6.

The same method for calculating profitability has been used as for the case farm studies in Chapter 6.

Farmers accounts for the 1964/65 season (the latest accounts available at the time of inspection of the farm) have been modified by an index to the 1966 level, and used as the base year. Where pigs were run in 1964/65 but not in 1965/66 season, an adjustment has been made to the farmers accounts to remove the pig costs and income. These adjustments were made so that the proposed development was based on the current farm situation and current prices.[1]

The reward to owner during development has been fixed at the base year level, until borrowing has been repaid. The assumptions made mean that the profitability studies have been generalized to apply to all farmers in a similar situation. This method has disadvantages considering the fact that these studies are being used in Sections 8.4, 8.5, and 8.6 to illustrate points in particular situations. These disadvantages however, can be balanced against the ease

---

1. For a fuller explanation of adjustments and assumptions see Section 6.5.

of calculation and the more general applicability of the results.

In each of these studies the proposed development has not involved an extensive programme and development has been assumed to take place in one year.

Summarized development budgets are given at the end of this appendix for each farm.

F.1 Survey Farm Number 16

F.1.1 The farm

This farm of 70 acres is situated on Soil Group 3, on the Rangitaiki Plains.

Fixed inputs such as fences and buildings (haybarn, tool shed and milking shed) are in good condition. The milking shed is a new 3-doubled-up walk through shed. Drainage is average. Pastures are paspalum dominant. Fertilizer is applied by bulk lorry at the rate of 3 cwt per acre of straight superphosphate in autumn.

In the 1964/65 season the farm was running 63 cows (0.9 cows per acre) and producing 18,270 lb butterfat (290 lb butterfat per cow, and 261 lb per acre).

Calving date was the 10th July, and hay was the only supplementary feed fed.

F.1.2 Proposed development plan

The suggested development plan involves employing a youth and milking another 25 cows. This would increase the stocking rate from 0.9 to 1.25 cows per acre. The butterfat production would be expected to increase by 7000 lb. A whare, already existing near the house, would have to be renovated. The fertilizer would be changed to 30 per cent potassic superphosphate, and the application rate increased by 2 cwt per acre. Calving date would be put back to the 1st August. Pasture species would be expected to change to a ryegrass sward with the heavier stocking rate. The owner would have to do almost as much work as he was previously.

F.1.3 Profitability of development

Capital Expenditure

Repair whare	150
25 cows @ $96	2400
Total	$2550

Partial Budget

Extra expenses		Extra income	
25 per cow expenses @ $10	250	7000 lb butterfat @ $0.3596	2520
Wages & keep for youth	1600	14 bobby calves @ $5	70
7 tons potassic superphosphate @ $33	231	6 cull cows @ $42	252
Total	$2081	Total	$2842

Table F.1 summarizes the profitability of development and shows that the added annual post tax cash profit would be $447.8, after a 4 year payback period. It can be seen that it would be profitable to employ a youth on this farm and to milk an extra 25 cows.

Taxation takes 42.4 per cent of the present value of the added cash profits from this development.

F.2 Survey Farm Number 18

F.2.1 The farm

This farm of 150 acres is situated in Galatea on Horomanga sand (Soil Group 2) and has a 30 acre run off. A son is employed as a 29 per cent sharemilker.

There are 33 acres of lucerne. Most of the remainder of the farm is in reasonably good ryegrass-white clover pastures, but a few paddocks have a lot of browntop in them. Fences and buildings are all in average condition. The cowshed is a 4-doubled-up walk through shed.

In the 1965/66 season an average of 3 cwt per acre of 30 per cent potassic superphosphate was applied in spring. The calving date was the 15th July. In this year 110 cows (0.73 cows per acre) were milked producing 36,000 lb butterfat (326 lb butterfat per cow and 240 lb per acre).

Table F.1 Profitability of Proposed Development - Survey Farm Number 16

	Base year	Year 1	Year 2	Year 3	Year 4	New equilibrium
Income						
Gross cash income	7426.6	10268.6	10268.6	10268.6	10268.6	10268.6
Addition cash income	N.A.	2842.0	2842.0	2842.0	2842.0	2842.0
Expenditure						
Tax deductible cash expenditure	2111.2	6742.2	4263.0	4238.6	4213.2	4192.2
Non-tax deductible cash expenditure	Nil	Nil	Nil	Nil	Nil	Nil
Depreciation	153.6	153.6	153.6	153.6	153.6	153.6
Taxation						
Taxable income	5161.8	3372.8	5851.8	5876.2	5901.6	5922.8
Total tax paid	1069.6	462.6	1351.8	1362.4	1373.4	1382.6
Cash Statement						
Reward to owner	4245.6	4245.6	4245.6	4245.6	4328.8	4693.6
Annual overdraft	Nil	1182.0	Nil	Nil	Nil	Nil
Cumulative overdraft	Nil	1182.0	774.2	352.6	Nil	Nil
Interest	Nil	Nil	70.8	46.4	21.0	Nil
Development Cash Profits						
Pre-tax added cash profits	N.A.	-1789.0	690.0	714.4	739.8	761.0
Post-tax added cash profits	N.A.	-1182.0	407.6	421.6	435.8	447.8

Note: 'N.A.' indicates 'not applicable'

Pre-tax Return on Investment = 54.7%
Post-tax Return on Investment= 31.5%
Maximum Overdraft = $1,182.0

Payback Period = 4 years
Present Value of Pre-tax Added Cash Profits = $10,158.6
Present Value of Post-tax Added Cash Profits= $ 5,859.6

F.2.2 Proposed development plan

The development programme analysed below includes adding an extra 50 cows (stocking rate would then be 1.07 cows per acre), building another house and employing a married man. Fertilizer application rate would be increased by 2 cwt per acre of 30 per cent potassic superphosphate, applied in autumn. The calving date would be set back to the 1st August, and the cowshed would be enlarged.

F.2.3 Profitability of development

The capital expenditure to be paid by the owner would involve $11,100 made up as follows:

House	6000
50 cows @ $96	4800
Cowshed extension	300
Total	$11100

The development on this farm is evaluated below firstly for the situation where the farm is owner operated and secondly where a 29 per cent sharemilker is employed.

Partial Budget for Owner Operator Situation

Extra expenses		Extra income	
50 per cow expenses @ $10	500	13600 lb butterfat @ $0.3596	4890
15 tons fertilizer @ $33	496	30 bobby calves @ $5	150
Wages	2400	12 cull cows @ $42	504
Total	$3396	Total	$5544

If this farm were owner operated the son could be paid a wage equivalent to what he is currently receiving as a sharemilker.

The profitability of development on this farm, if owner operated, is summarized in Table F.2 where it is seen that the post tax added cash profit is increased by $\not{\$}$1,153.2 per annum, after a 9 year payback period. The maximum overdraft is $\not{\$}$7,679.2 because of the large capital expenditure required on stock and housing.

Taxation takes 57.1 per cent of the present value of the added cash profits from this development.

Partial Budget for Sharemilking Situation

Extra expenses		Extra income	
Owner (Father):			
50 per cow expenses @ $\not{\$}$5	250	71% of 13600 lb butterfat @ $\not{\$}$0.3596	3470
15 tons fertilizer @ $\not{\$}$33	496	50% of 30 bobby calves @ $\not{\$}$5	75
Wages	1200	12 cull cows @ $\not{\$}$42	504
Total	$\not{\$}$1946	Total	$\not{\$}$4049
29% Sharemilking (Son):			
50 per cow expense @ $\not{\$}$5	250	29% of 13600 lb butterfat @ $\not{\$}$0.3596	1420
Wages	1200	50% of 30 bobby calves @ $\not{\$}$5	75
Total	$\not{\$}$1450	Total	$\not{\$}$1495

Under the 29 per cent share agreement the wages to extra labour have been divided equally between the owner and the sharemilker.

There is very little difference between the sharemilkers extra expenses and extra income. As all his expenses are tax deductible the development would leave his before and after tax income uneffected. Only if the extra labour employed resulted in the sharemilker being

Table F.2 — **Profitability Of Proposed Development - Survey Farm Number 18**

	Base year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	New equilibrium
Income											
Gross cash income	1373.2	19281.2	19281.2	19281.2	19281.2	19281.2	19281.2	19281.2	19281.2	19281.2	19281.2
Additional cash income	N.A.	5544.0	5544.0	5544.0	5544.0	5544.0	5544.0	5544.0	5544.0	5544.0	5544.0
Expenditure											
Tax deductible cash expenditure	6560.4	14756.4	10417.0	10360.4	10302.0	10242.2	10180.4	10117.2	10052.0	8985.2	9956.4
Non-tax deductible cash expenditure	Nil	6300.0	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Depreciation	1135.2	2485.2	1285.2	1285.2	1285.2	1285.2	1285.2	1285.2	1285.2	1285.2	1285.2
Taxation											
Taxable income	6041.6	2039.6	7578.8	7635.4	7693.8	7753.6	7815.4	7878.6	7943.8	8010.6	8039.6
Total tax paid	1434.2	161.6	2176.6	2206.4	2237.4	2296.6	2302.6	2336.8	2372.4	2411.6	2429.0
Cash Statement											
Reward to owner	5742.4	5742.4	5742.4	5742.4	5742.4	5742.4	5742.4	5742.4	5742.4	6401.6	6895.6
Annual overdraft	Nil	7679.2	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Cumulative overdraft	Nil	7679.2	6734.2	5762.4	4763.4	3736.6	2681.0	1596.4	482.4	Nil	Nil
Interest	Nil	Nil	460.6	404.0	345.6	285.8	224.0	160.8	95.6	28.8	Nil
Development Cash Profits											
Pre-tax added cash profits	N.A.	-8952.0	1687.2	1743.8	1802.2	1862.0	1923.8	1987.0	2052.2	2119.0	2148.0
Post-tax added cash profits	N.A.	-7679.2	944.8	971.6	999.0	1026.8	1055.4	1084.6	1114.0	1141.6	1153.2

Note: 'N.A.' indicates 'not applicable'

Pre-tax Return on Investment = 19.7%
Post-tax Return on Investment = 8.4%
Maximum Overdraft = $7,679.2

Payback Period = 9 years
Present Value of Pre-tax Added Cash Profits = $23,749.2
Present Value of Post-tax Added Cash Profits = $10,187.6

able to work less would there be any incentive to co-operation in this development. This is unlikely to be the situation, and thus this programme which would be profitable if the farm were owner operated is unprofitable for a 29 per cent sharemilker.

F.3 Survey Farm Number 22

F.3.1 The farm

This 175 acre farm in Galatea has 20 acres of waste land. The farm consists of approximately two thirds Group 1 soils, and one third Group 3 soils.

Fences and buildings are generally in poor condition; the cowshed will have to be renewed within five years. The farm has 25 acres of lucerne, but otherwise pastures are poor and contain a lot of yorkshire fog and browntop. About five acres of turnips are grown each summer. Hay and silage are made from both lucerne and pasture. Topdressing is done by farm spinner in spring at the rate of 4 cwt per acre of straight superphosphate.

In 1965/66 season 75 cows were milked (0.5 cows per usable acre) and produced 21,000 lb butterfat (276 lb butterfat per cow and 120 lb per total acre). The calving date was late July.

F.3.2 Proposed development plan

The development plan evaluated below involves milking an extra 65 cows and doubling production to 42,000 lb butterfat. This would require a higher managerial level than at present. A married man would have to be employed, and a house and 12 a side Herringbone cowshed built. Fences would be renewed and some further subdivision carried out. The fertilizer would be changed to 30 per cent potassic superphosphate, and the application rate increased by 1 cwt per acre. The heavy stocking rate would be expected to lead to pasture improvement, but some pasture renewal would be done each year for the next ten years.

F.3.3 Profitability of development

Capital Expenditure

House	6000
65 cows @ $96	6240
Cowshed	4000
Fencing	1000
Total	$17240

Partial Budget

Extra expenses		Extra income	
65 per cow expenses @ $10	650	21,000 lb butterfat @ $0.3596	7560
8 ton fertilizer @ $33	264	40 bobby calves @ $5	200
Pasture renewal	200	15 cull cows @ $42	630
Wages	2400		
Total	$7514	Total	$8390

Table F.3 summarizes the profitability of this proposed development programme, and shows that it would be highly profitable to the owner, returning an added annual post tax cash profit of $2,456.8, after a 6 year payback period.

Taxation takes 56.7 per cent of the present value of the added cash profits from this development.

Table F.3 Profitability of Proposed Development - Survey Farm Number 22

	Base year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	New equilibrium
Income								
Gross cash income	7629.2	16011.2	16011.2	16011.2	16011.2	16011.2	16011.2	16011.2
Additional cash income	N.A.	8382.0	8382.0	8382.0	8382.0	8382.0	8382.0	8382.0
Expenditure								
Tax deductible cash expenditure	2091.2	12845.2	6287.2	6153.4	6016.6	5877.2	5735.2	5605.2
Non-tax deductible cash expenditure	Nil	10000.0	Nil	Nil	Nil	Nil	Nil	Nil
Depreciation	527.2	2837.2	837.2	837.2	837.2	837.2	837.2	837.2
Taxation								
Taxable income	5010.8	328.8	8886.6	9020.4	9157.2	9296.6	9438.6	9568.8
Total tax paid	1011.2	9.0	2964.0	3051.6	3144.4	3238.6	3334.4	3422.2
Cash Statement								
Reward to owner	4526.6	4526.6	4526.6	4526.6	4526.6	4526.6	4774.6	6983.6
Annual overdraft	Nil	11369.6	Nil	Nil	Nil	Nil	Nil	Nil
Cumulative overdraft	Nil	11369.6	9136.6	6858.4	4535.2	2166.6	Nil	Nil
Interest	Nil	Nil	682.0	548.2	411.4	272.0	130.0	Nil
Development Cash Profits								
Pre-tax added cash profits	N.A.	-12372.0	4185.8	4319.6	4456.4	4595.8	4737.8	4868.0
Post-tax added cash profits	N.A.	-11369.6	2233.0	2278.2	2323.0	2368.4	2414.6	2456.8

Note: 'N.A.' indicates 'not applicable'

Pre-tax Return on Investment = 35.3%
Post-tax Return on Investment = 15.3%
Maximum Overdraft = $11,369.6

Payback Period = 6 years
Present Value of Pre-tax Added Cash Profits = $63,180.8
Present Value of Post-tax Added Cash Profits = $27,353.6

F.4 Survey Farm Number 26

F.4.1 The farm

This 97 acre farm situated in the Whakatane river valley is on Soil Group 4. Half the farm is subject to bad flooding from the Whakatane river. A 39 per cent sharemilker is employed.

The farm is subdivided half into 2 acre paddocks, and half into about 5 acre paddocks. Fences, the house, and hayshed (4000 bale capacity) are in average condition. The 4-doubled-up internal race cowshed is in good condition.

On the flood protected half of the farm the pastures are mainly good ryegrass-white clover swards, but the balance are rather rough.

In the 1964/65 season 81 cows (0.83 cows per acre) were milked and produced 27,200 lb butterfat (335 lb butterfat per cow and 280 lb per acre). Fertilizer is applied at the rate of 6 cwt per acre of 30 per cent potassic superphosphate. The time of application is spread over most of the year but each paddock receives its full dressing at one time.

F.4.2 Proposed development plan

A possible development scheme for this farm would include building a whare, employing a youth and milking an extra 35 cows. The calving date would be put back to 7th August. Production would be expected to rise by 11,540 lb butterfat to give 400 lb butterfat per acre.

F.4.3 Profitability of development

The capital expenditure by the owner required for this development would be:

Whare	500
35 cows @ $96	3360
Total	$3860

The development on this farm is evaluated below firstly for the situation where the farm is owner operated, and secondly for the actual situation where the farm is worked by a 39 per cent sharemilker.

Partial Budget for Owner Operator Situation

Extra expenses		Extra income	
35 per cow expenses @ $10	350	11540 lb butterfat @ $0.3596	4148
Wages & keep of youth	1600	22 bobby calves @ $5	110
		8 cull cows @ $42	336
Total	$1950	Total	$4594

The profitability of developing this farm under an owner operator situation is shown in Table F.4. The proposed development would increase the annual post tax cash profit by $1,316.4, after a 2 year payback period.

Taxation takes 50.9 per cent of the present value of added cash profits from this development.

Table F.4 Profitability of Proposed Development - Survey Farm Number 26

	Base year	Year 1	Year 2	New equilibrium
Income				
Gross cash income	10812.8	15408.4	15408.4	15408.4
Additional cash income	N.A.	4595.6	4595.6	4595.6
Expenditure				
Tax deductible cash expenditure	4554.2	9864.2	6557.2	6504.2
Non-tax deductible cash expenditure	Nil	500.0	Nil	Nil
Depreciation	522.6	635.2	535.2	535.2
Taxation				
Taxable income	5736.0	4909.0	8315.8	8369.0
Total tax paid	1302.8	972.6	2598.8	2632.0
Cash Statement				
Reward to owner	4955.6	4955.6	5368.0	6272.0
Annual overdraft	Nil	884.2	Nil	Nil
Cumulative overdraft	Nil	884.2	Nil	Nil
Interest	Nil	Nil	53.0	Nil
Development Cash Profits				
Pre-tax added cash profits	N.A.	-1214.4	2592.4	2645.6
Post-tax added cash profits	N.A.	-884.2	1296.4	1316.4

Note: 'N.A.' indicates 'not applicable'

Pre-tax Return on Investment = 290.6%
Post-tax Return on Investment = 142.7%
Maximum Overdraft = $884.2

Payback Period = 2 years
Present Value of Pre-tax Added Cash Profits=$40,404.6
Present Value of Post-tax Added Cash Profits=$19,846.6

Partial Budget for Sharemilking Situation

Extra expenses		Extra income	
Owner			
35 per cow expenses @ $\not{\$}$2	70	61% of 11540 lb butterfat @ $\not{\$}$0.3596	2530
		50% of 22 bobby calves @ $\not{\$}$5	55
		8 cull cows @ $\not{\$}$42	336
Total	$\not{\$}$70	Total	$\not{\$}$2921
Sharemilker			
35 per cow expenses @ $\not{\$}$8	280	39% of 11540 lb butterfat @ $\not{\$}$0.3596	1618
Wages & keep of youth	1600	50% of 22 bobby calves @ $\not{\$}$5	55
		50% of value of extra heifers reared	100
Total	$\not{\$}$1880	Total	$\not{\$}$1773

The above partial budget shows that it would be unprofitable for the sharemilker to employ a youth because of the unequitable division of extra returns, yet it would be highly profitable for the owner.

F.5 Survey Farm Number 19

F.5.1 The farm

This farm of 156 acres has a 21 acre run-off. The farm is situated in Galatea, on Horomanga sand (Soil Group 2).

The farm is subdivided into 24, approximately 6 acre paddocks, all with a good water supply. The house, haybarn (5000 bale capacity), implement shed, and 8-a-side Herringbone cowshed are all in average condition.

There are 33 acres of lucerne on the farm. Half of the pastures are fairly good ryegrass - white clover pastures, but the remainder are browntop dominant. Five acres of summer turnips are grown annually.

In the 1964/65 season 97 cows (0.62 cows per acre) were milked producing 28,350 lb butterfat (270 lb butterfat per cow and 182 lb per acre). Fertilizer is applied, mainly in spring, at the rate of 3 cwt per acre of 30 per cent potassic superphosphate. The calving date is the 20th July. A few (5) more calves are reared than are needed for replacements, and are sold as in-calf heifers.

F.5.2 Proposed development plan

The development plan evaluated below proposes milking 55 extra cows, employing a married man, building a house, extending the cowshed, carry out further subdivision, controlling grass grub, and apply another 2 cwt per acre of 30 per cent potassic superphosphate each year. Calving would be put back to 1st August. Cropping would be cut out and the farmers wife would do less farm work than at present. Surplus heifers to sell would not be reared. The expected total production would be 44,850 lb butterfat (295 lb butterfat per cow, and 288 lb per acre).

F.5.3 Profitability of development

Capital Expenditure

House	6000
55 cows @ $96	5280
Cowshed extension	400
Subdivision	800
Total	$12480

Partial Budget

Extra expenses		Extra income	
55 per cow expenses @ $10	550	16500 lb butterfat @ $0.3596	5930
Wages	2400	30 bobby calves @ $5	150
16 tons fertilizer @ $33	528	13 cull cows @ $42	546
Grass grub control	100		
	$3578		$6626
Reduced income		**Reduced expenses**	
Loss on sale of 5 heifers	480	Cropping expenses	100
	$480		$100
Total	$4058	Total	$6726

Table F.5 summarizes the profitability of this proposed development programme, which after an 8 year payback period, would return an added annual post tax cash profit of $1,492.6.

Table F.5 — Profitability of Proposed Development - Survey Farm Number 19

Income	Base year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	New equilibrium
Gross cash income	11468.8	18194.8	18194.8	18194.8	18194.8	18194.8	18194.8	18194.8	18194.8	18194.8
Additional cash income	N.A.	6726.0	6726.0	6726.0	6726.0	6726.0	6726.0	6726.0	6726.0	6726.0
Expenditure										
Tax deductible cash expenditure	5204.8	15316.8	9767.6	9690.8	9613.8	9524.6	9453.8	9369.4	9283.4	9244.8
Non-tax deductible cash expenditure	Nil	6400.0	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Depreciation	938.6	2288.6	1088.6	1088.6	1088.6	1088.6	1088.6	1088.6	1088.6	1088.6
Taxation										
Taxable income	5325.4	589.4	7340.4	7425.2	7492.2	7571.4	7652.8	7736.6	7822.6	7861.4
Total tax paid	1134.0	28.6	2053.0	2091.4	2131.2	2172.8	2215.6	2260.4	2306.6	2372.4
Cash Statement										
Reward to owner	5129.8	5129.8	5129.8	5129.8	5129.8	5129.8	5129.8	5129.8	5960.8	6622.4
Annual overdraft	Nil	8680.4	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Cumulative overdraft	Nil	8680.4	7434.0	6151.4	4831.8	3474.4	2078.4	643.6	Nil	Nil
Interest	Nil	Nil	520.8	446.0	369.0	289.8	208.4	124.6	38.6	Nil
Development Cash Profits										
Pre-tax added cash profits	N.A.	-9786.0	2165.0	2239.8	2316.8	2396.0	2477.4	2561.2	2647.2	2686.0
Post-tax added cash profits	N.A.	-8680.4	1246.2	1282.6	1319.6	1357.2	1395.8	1434.8	1474.8	1492.6

Note: 'N.A.' indicates 'not applicable'

Pre-tax Return on Investment = 23.0%
Post-tax Return on Investment = 10.6%
Maximum Overdraft = $8,680.4

Payback Period = 8 years
Present Value of Pre-tax Added Cash Profits = $31,399.4
Present Value of Post-tax Added Cash Profits = $14,529.4

Table F.6

Summary of Profitability of Proposed Development Programmes

Management	Unit	Farm Number 16	Farm Number 18			Farm Number 22	Farm Number 26			Farm Number 19
		Owner operator	Owner operator	Share farm Owner	Share farm Milker	Owner operator	Owner operator	Share farm Owner	Share farm Milker	Owner operator
Physical Information										
Area	Acres	70	150	150	150	175	97	97	97	156
Soil group		3	2	2	2	1	4	4	4	2
Percent increase production	%	38.3	37.8	37.8	37.8	100.0	42.5	42.5	42.5	58.3
Profitability Criteria										
Pre-tax added cash profit	$	761.0	2148.0	N.C.	N.C.	4868.0	2645.6	N.C.	N.C.	2686.0
Post-tax added cash profit	$	447.8	1153.2	N.C.	N.C.	2456.8	1316.4	N.C.	N.C.	1492.6
Pre-tax return on investment	%	54.7	19.7	N.C.	N.C.	35.3	290.6	N.C.	N.C.	23.0
Post-tax return on investment	%	31.5	8.4	N.C.	N.C.	15.3	142.7	N.C.	N.C.	10.6
Maximum overdraft	$	1182.0	7679.2	N.C.	N.C.	11369.6	884.2	N.C.	N.C.	8680.4
Payback period	years	4	9	N.C.	N.C.	6	2	N.C.	N.C.	8
Present value of pre-tax added cash profits	$	10158.6	23749.2	N.C.	N.C.	63180.8	40404.6	N.C.	N.C.	31399.4
Present value of post-tax added cash profits	$	5859.6	10187.6	N.C.	N.C.	27353.6	19846.6	N.C.	N.C.	14529.4
Taxation										
Percent of present value of added cash profits taken by taxation	%	42.4	57.1	N.C.	N.C.	56.7	50.9	N.C.	N.C.	53.7

'N.C.' indicates 'not calculated' because overall programme is unprofitable to the sharemilker.

Taxation takes 53.7 per cent of the present value of the added cash profits from this development.

F.6 Summary

In this appendix proposed development has been evaluated for 5 survey farms. A summary of these evaluations is given in Table F.6. In each case it has been shown that if these farms were owner operated the development would be highly profitable. Two of the actual farms evaluated however currently employ sharemilkers and it has been shown that the proposed development is not profitable to the sharemilkers.

The effect of taxation on these development programmes is considerable, and amounts to an average reduction of 52.5 per cent of the present value of the added cash returns. This must be a major disincentive to farmers to develop.

F.7 Budgets of Proposed Development

The following budgets are for the development evaluated on the 5 farms in this appendix. All figures have been quoted after adjustment to the 1966 level.

Survey Farm Number 16

Tax Deductible Cash Expenditure

Item	Base year	Development year	New equilibrium
Wages	22.4	1622.4	1622.4
Contractors	261.0	261.0	261.0
Rates	175.4	175.4	175.4
Rent	2.0	2.0	2.0
Insurance	22.0	22.0	22.0
Repairs & maintenance	161.2	311.2	161.2
Tractor) Car) expenses	493.4	493.4	493.4
Seed & manure	297.0	528.0	528.0
Shed expenses) Feed) Hay baling) A.B.) Veterinary) Herd testing)	522.8	772.8	772.8
Sundry	154.0	154.0	154.0
In calf heifers	Nil	2400.0	Nil
TOTAL $	2111.2	6742.2	4192.2

Non-tax Deductible Cash Expenditure

TOTAL $	Nil	Nil	Nil

Survey Farm Number 16 continued

Depreciation

Depreciation ¢	153.6	153.6	153.6

Gross Cash Income

Butterfat	6570.6	9090.6	9090.6
Produce used	20.0	20.0	20.0
Dairy factory rebate	30.0	30.0	30.0
Cull cows	546.0	798.0	798.0
Potter bulls	50.0	50.0	50.0
Bobby calves	210.0	280.0	280.0
TOTAL ¢	7426.6	10268.6	10268.6

Survey Farm Number 18

Tax Deductible Cash Expenditure

Item	Base year	Development year	New equilibrium
Wages	2773.4	5173.4	5173.4
Contractors	212.8	212.8	212.8
Rates	145.8	145.8	145.8
Rent	94.6	94.6	94.6
Insurance	102.0	102.0	102.0
Repairs & maintenance	473.4	473.4	473.4
Electric power	194.0	194.0	194.0
Tractor) Car) expenses	1151.0	1151.0	1151.0
Freight & cartage	18.2	18.2	18.2
Seed & manure	815.8	1311.8	1311.8
Shed expenses) Feed) Hay baling) A.B.) Veterinary) Herd testing)	411.4	911.4	911.4
Sundry	168.0	168.0	168.0
In calf heifers	Nil	480.0	Nil
TOTAL $	6560.4	14756.4	9956.4

Non-tax Deductible Cash Expenditure

Buildings	Nil	6300	Nil
TOTAL $	Nil	6300	Nil

Survey Farm Number 18 continued

Depreciation

Depreciation $	1135.2	2485.2	1285.2

Gross Cash Income

Butterfat	12145.2	17035.2	17035.2
Produce used	20.0	20.0	20.0
Dairy factory rebate	72.0	72.0	72.0
Cull cows	1050.0	1554.0	1554.0
Potter bulls	100.0	100.0	100.0
Bobby calves	350.0	500.0	500.0
TOTAL $	13737.2	19281.2	19281.2

Survey Farm Number 22

Tax Deductible Cash Expenditure

Item	Base year	Development year	New equilibrium
Wages	Nil	2400.0	2400.0
Contractors	55.6	55.6	55.6
Rates	77.2	77.2	77.2
Rent	32.8	32.8	32.8
Insurance	31.8	31.8	31.8
Repairs & maintenance	111.4	111.4	111.4
Tractor) Car) expenses	421.8	421.8	421.8
Freight & cartage	85.2	85.2	85.2
Seed & manure	827.4	1291.4	1291.4
Shed expenses) Feed) Hay baling) A.B.) Veterinary) Herd testing)	357.6	1007.6	1007.6
Sundry	90.4	90.4	90.4
In calf heifers	Nil	6240.0	Nil
Fencing	Nil	1000.0	Nil
TOTAL $	2091.2	12845.2	5605.2

Non-tax Deductible Cash Expenditure

Buildings	Nil	10000	Nil
TOTAL $	Nil	10000	Nil

Survey Farm Number 22 continued

Depreciation

Depreciation ⌀	527.2	2837.2	837.2

Gross Cash Income

Butterfat	6706.2	14259.2	14259.2
Produce used	20.0	20.0	20.0
Dairy factory rebate	14.0	14.0	14.0
Cull cows	588.0	1218.0	1218.0
Potter bulls	50.0	50.0	50.0
Bobby calves	250.0	450.0	450.0
TOTAL ⌀	7629.2	16011.2	16011.2

Survey Farm Number 26

Tax Deductible Cash Expenditure

Item	Base year	Development year	New equilibrium
Wages	875.6	2475.6	2475.6
Contractors	86.4	86.4	86.4
Rates	308.6	308.6	308.6
Insurance	58.0	58.0	58.0
Repairs & maintenance	596.0	596.0	596.0
Electric power	240.0	240.0	240.0
Tractor) Car) expenses	657.8	657.8	657.8
Freight & cartage	121.8	121.8	121.8
Seed & manure	866.8	866.8	866.8
Shed expenses) Feed) Hay baling) A.B.) Veterinary) Herd testing)	599.2	909.2	909.2
Sundry	184.0	184.0	184.0
In calf heifers	Nil	3360.0	Nil
TOTAL ∅	4554.2	9864.2	6504.2

Non-tax Deductible Cash Expenditure

Buildings	Nil	500	Nil
TOTAL ∅	Nil	500	Nil

Survey Farm Number 26 continued

Depreciation

Depreciation $	522.6	635.2	535.2

Gross Cash Income

Butterfat	9768.8	13198.4	13918.4
Produce used	10.0	10.0	10.0
Cull cows	714.0	1050.0	1050.0
Potter bulls	50.0	50.0	50.0
Bobby calves	270.0	380.0	380.0
TOTAL $	10812.8	15408.4	15408.4

Survey Farm Number 19

Tax Deductible Cash Expenditure

Item	Base year	Development year	New equilibrium
Wages	1196.0	3596.0	3596.0
Contractors	68.2	68.2	68.2
Rates	141.6	141.6	141.6
Rent	237.6	237.6	237.6
Insurance	22.0	22.0	22.0
Repairs & maintenance	453.0	453.0	453.0
Tractor) Car) expenses	832.4	832.4	832.4
Freight & cartage	97.4	97.4	97.4
Seed & manure	1227.4	1891.4	1891.4
Shed expenses) Feed) Hay baling) A.B.) Veterinary) Herd testing)	691.2	1241.2	1241.2
Sundry	184.0	184.0	184.0
In calf heifers	Nil	5280.0	Nil
Loss on sale of heifers	Nil	480.0	480.0
Subdivision	Nil	800.0	Nil
TOTAL $	5204.8	15316.8	9244.8

Non-tax Deductible Cash Expenditure

Buildings	Nil	6400	Nil
TOTAL $	Nil	6400	Nil

Survey Farm Number 19 Continued

Depreciation

Depreciation ∅	938.6	2288.6	1088.6

Gross Cash Income

Butterfat	10193.8	16123.8	16123.8
Produce used	20.0	20.0	20.0
Dairy factory rebate	64.0	64.0	64.0
Cull cows	756.0	1302.0	1302.0
Potter bulls	100.0	100.0	100.0
Bobby calves	335.0	485.0	485.0
Reduced cropping exp.	Nil	100.0	100.0
TOTAL ∅	11468.8	18194.8	18194.8