LINCOLN COLLEGE
(CANTERBURY AGRICULTURAL COLLEGE)
University of New Zealand

Sheep Farming in Waipukurau County Hawkes Bay

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TECHNICAL PUBLICATION Number 10 OCTOBER, 1953

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Printed by SIMPSON & WILLIAMS LTD., 169 St. Asaph St., Ch'ch.

SUMMARY

A survey of sheep farming in Waipukurau County has been made by visiting all sheep farmers, the two freezing works, appropriate Government departments and the relevant commercial firms. An analysis was made of farm output, farm-management practices, the financial position of occupiers and changes in land ownership on the three major soil divisions.

Production figures of wool, lamb, mutton, beef, store stock and crops were collected, together with farm-management practices. From these, standards of production and management were established for each soil division.

Physical and financial measurements of sheep and wool production proved that as carrying capacity increased—

1 size of farm, production per labour unit and per ewe equivalent all decreased.

2 production per acre and percentage of farm topdressed, limed and in fodder crops, all increased.

3 use of Southdown rams and rotational grazing methods increased.

Increased production in this area is influenced by the following factors:

1. Availability of finance.
2. Availability of materials, particularly superphosphate, lime and fencing materials.
3. Availability of labour, particularly contract labour.
4. Cost of transport, particularly to the more remote regions.
5. Drainage and flooding and, to a very minor extent, soil erosion.
6. Land tenure on a small area of Maori land.
7. Weeds and pests, notably scrub, winged thistle and barley grass.
8. Size of farm. In some areas subdivision into small units has led to increased farm output up to a point, decreased production per labour unit and decreased return per capital invested.

The balance of these conflicting tendencies depends on managerial ability and real farm income, i.e., the maximum size of farm is governed by managerial ability and the minimum size by real income.

SHEEP FARMING IN WAIPUKARAU COUNTY HAWKES BAY

INTRODUCTION

This farm survey was made in 1951-52 and covers the season 1 July 1950, to 31 June 1951. It was originally carried out as a thesis for M.Agr.Sc. at Lincoln College, and this publication is a summary of the thesis. In this summary the history of the county, discussion of soils and farming, and the financial and capital analysis of farming have been omitted.

Waipukurau County was selected as being small and reasonably typical of better-class Hawkes Bay country containing a wide range of soil, topographic and climatic types.

In the survey it was intended to visit all farmers (113) with more than 500 sheep. The final sample was 111 of these, covering 90.8 per cent of the county area (81,920 acres), and 92.5 per cent of the county flock (204,083 sheep). The farm details, wherever possible, were obtained from the farmer's diary, tally books, vouchers, accounts and killing sheets. Complete financial details were collected from 25 farmers. Other county details were obtained from Government departments, stock and station agents and the county clerk.

The aims of the survey may be listed as follows:

1. To gain knowledge with regard to the economic facts concerning sheep farming in Hawkes Bay.
2. To use the facts so gained,
   (a) to show management practices and their effect on farm production and returns, with particular reference to fat lamb production.
   (b) to answer current economic problems such as the best means of increasing production, the problems in land development, the effects of taxation and size of farm, on farming production and returns, and the progress made in land settlement.

A. DESCRIPTION OF THE COUNTY

1. Historical.

The Waipukurau Block of 279,000 acres was purchased for £4,800 in 1851 and the adjacent Porangahau Block, 190,000 acres, was bought in 1859 for £3,300. The present county comprises parts of these two blocks and was formed in 1907. The first sheep in the district arrived in December, 1851, and by 1854 practically all the present county area was taken up in five runs.

2. Descriptive.

(a) General. Waipukurau is a sheep farming county, situated in Central Hawkes Bay approximately 20 miles inland and 50 miles south of Napier. Of the total area of 81,920 acres, 91 per cent is devoted to full-time sheep farming and 1 per cent to semi-dairying and sheep. Fifteen per cent is flat, 60 per cent rolling and ploughable hills, and 25 per cent unploughable. The rainfall varies from 33 inches at Waipukarau township to over 50 inches in the higher altitude country of the south-west 15 miles from the township.

(b) Erosion. Erosion is not serious over most of the county and on 72 per cent of the properties it is not a problem. River erosion affects two properties on the banks of the Tukituki River. Wind erosion affects seven properties on the lighter shale country, and significant gully and slip erosion affect 23 properties. Drainage is a problem over 10,600 acres, 78 per cent of which is round Hatuma Lake, including 2,000 acres subject to flooding.

(c) Cover. The cover reflects the relatively-advanced stage of development of the county when compared with the figures for the marginal Akitio County.

Table 1. Cover of Waipukurau Compared with Akitio County.

Cover	Waipukurau Area in Ac.	Waipukurau % (1951 fig.)	Akitio % (1950 fig.)
Area in			
good pasture	45,394	55.75	10.00
native pasture	18,869	23.17	65.04
scattered scrub and native pasture	4,971	6.11	13.92
dense scrub	6,181	7.59	8.04
fern	—	—	.03
standing bush	325	.40	1.66
fallow and crops Jan. '51	3,496	4.29	0.55
buildings and unproductive	2,194	2.69	0.76
Total	81,420	100.00	100.00

The flats and downs are natural perennial ryegrass and white-clover country, while the drier hill-country tends to browntop, danthonia, sweet vernal, subterranean clover and ratstail. There was a total of 2950 acres in fodder crops in 1950-51 (1120 acres summer crop, and 1830 winter crop), and of this chou moellier, or chou moellier mixed with swedes or turnips, formed 71 per cent. Cash crops assume very little importance with only 203 acres of which 187 acres were in peas. Perennial ryegrass seed was taken off 1260 acres on 37 farms.

(d) Weeds. Manuka scrub is the most important weed on the more extensive country. Barley grass causes most concern on the better class country and is becoming serious on 38 farms. Winged thistle occurs to some extent on nearly all properties and in some cases is serious. Californian and Scotch thistles are widespread and a problem in some cases. Variegated and nodding thistle are present in isolated cases but are well under control. Gorse and blackberry occur in river beds but otherwise are unimportant. The most serious weeds in cultivated ground are fathen, sorrel and black nightshade.

(e) Pests. Rabbits present a problem on 24 properties on the drier scrub country and could become serious on a further 30 properties. The rabbit situation became serious during the Second World War 1939-45, but is improving now under the action of the rabbit board and individuals.

Grass grub is seldom serious. It is seasonal and occurs in patches which usually rejuvenate themselves, but occasional over-sowing of affected areas is necessary.

(f) Water supply. The stock water supply on county farms is good. On 25 properties water is not present, or is not available throughout the year in all paddocks. Most properties depend on creeks, dams and springs and 16 farms on the flats use a pump and troughs for water reticulation.

(g) Fencing and subdivision. There are approximately 72,000 chains of fencing in the county and of this 4200

Table 2. Utilisation of Superphosphate in 1950-51.

UTILISATION			AREA	%
Area of sown pasture topdressed with superphosphate at				
1 cwt per acre	920	ac.		
1½ „ „ „	16,100	„		
2 „ „ „	5,673	„		
2½ „ „ „	800	„		
3–3½ „ „ „	1,153	„		
			24,646	77.1
Area of native pasture topdressed at				
1½ cwt per acre	2,292	ac.		
2 „ „ „	770	„		
			3,062	9.9
Area of crop drilled with superphosphate at				
1½ to 2 cwt per acre			2,949	9.0
Area of new grass topdressed with superphosphate at				
1½ to 2 cwt per acre			1,315	4.0
TOTAL			31,972	100.0

This total area is approximately 40 per cent of the area covered by the survey.

chains were re-erected, and 200 chains of new fencing were erected by contract in 1950-51. Subdivision varies according to the class of country. On the 1 to 2 ewe-per-acre extensive country average paddock sizes are 80-200 acres while they are reduced to 15-30 acres on the 3 to 5 ewe-per-acre intensive country.

(h) Topdressing. Superphosphate is used extensively and regularly on 95 per cent of farms at 1 to 3½ cwt (average 1½ cwt) per acre. Superphosphate is drilled with all crops at 1 to 2 cwt per acre.

Table 3. Methods of Sowing Superphosphate.

Methods of Sowing Superphosphate	Weight in Tons	%
By farmers through a topdresser	1,250	40.2
„ „ „ blower	166	5.4
„ air (contract)	547	17.5
„ contractor through a topdresser	463	14.9
„ hand (mostly contract)	360	11.6
Sown with crops or on new grass	322	10.4
Total	3,108	100.0

Lime is not very widely used in the county. In 1950-1951 3,530 tons were used over 5,564 acres on 53 properties, 73 per cent being applied by contract.

(i) County facilities. The county is well served by rail, roads, electricity, telephone, sale yards and other community facilities.

(j) County farming. There are 169 holdings in the county and 151 are over 50 acres in area. One hundred and thirty-one run sheep and of these 111 are full-time sheep farms and two run a dairy herd in addition to flocks of 500 or more sheep.

One hundred and eleven farms were covered in the survey and of these 42 per cent were engaged in intensive fat lamb production, 30 per cent were part-fattening farms, and 22 per cent were Romney store breeding properties and six per cent had large associated enterprises. All these farms carried a total of 215,937 adult sheep (149,470 ewes), and 7,580 adult cattle on 81,420 acres.

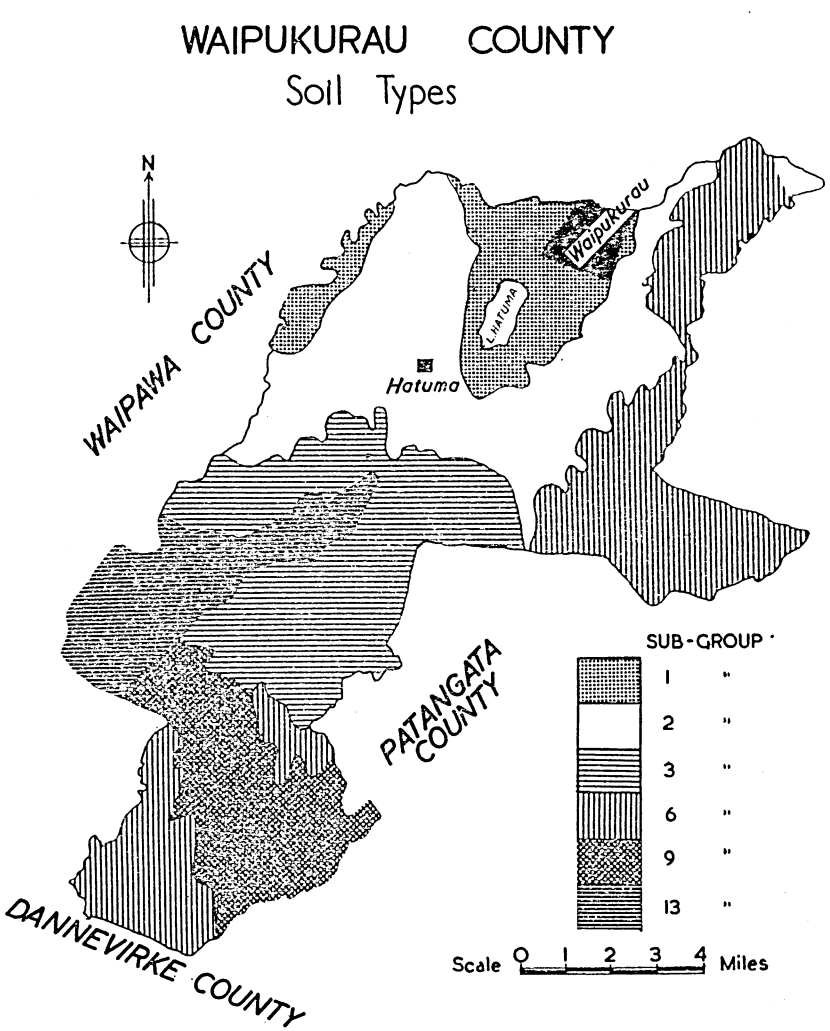
(k) County production. The total production of the surveyed farms for the 1950-51 season was:

Fat lambs	86,270
Store lambs	10,990
Fat ewes	22,845
Cast two-tooth ewes	5,472
Cast breeding ewes (5 year)	9,020
Fat cattle	850
Store cattle	370
Wool	2,136,700 lb

plus a small amount of grass seed, peas, wheat and barley.

3. **Soils and farming.**

This section is based on the survey of the area by the Soil Bureau of the Department of Scientific and Industrial Research.*



For the purpose of studying sheep-farm management in the county, farms have been divided into three groups on the basis of soils, as follows:

Farm Group I. Farms in this group are on soils in sub-groups

*"Soils and Some Related Agricultural Aspects of Mid Hawkes Bay." D.S.I.R. Bulletin No. 94.

1 and 2; this is of the intensive fat-lamb country, carrying capacity 3-5 ewes per acre.

Farm Group II is soil sub-group 3; this is part fattening country, carrying capacity 2-3 ewes per acre.

Farm Group III is soil sub-group 6-9 and 13; this is extensive Romney store breeding country, carrying capacity ½-2 ewes per acre.

In all subsequent descriptions and analysis of county farming the above classification is used.

4. Land Transfers, Tenures, Management and Labour.

(a) Land transfers. This section is based on details of the transfers of the 151 rural blocks of land over 50 acres in area in this county from 1905 to 1952. The total registered transfers of these 151 blocks number 333, over the period 1905-1952. They may be usefully classified as follows:

(i)	Nominal transfers.			
	Purchase of lease without change of owner	29		
	Husband to wife or vice versa .	7		
		—	36	10.8%
(ii)	Amalgamation of land		17	5.1%
(iii)	Subdivisions of land		50	15.0%
(iv)	Transfers of blocks as self-sufficient units		230	69.0%
			333	100.0%

Of the 230 transfers of self-sufficient blocks there are

(i)	transfers within a family			
	to sons	21		
	to estates	21		
		—	42	18.3%
(ii)	transfers to other than family .	188	188	81.7%
			230	100.0

Of the 151 blocks of over 50 acres 61, or 44 per cent have not changed in size over the past 48 years. In these properties the average time each owner has held the property is 25 years. Of the remaining 90 blocks 82 are from subdivision since 1905 and eight are the result of amalgamation. In nine cases there was amalgamation with subsequent subdivision.

(b) Management and tenure. Of the 107 farmers interviewed 48 per cent were owners, 19 per cent lessees, 18 per cent managers for estates and a further 15 per cent were managers. Of all these farmers eight per cent came from occupations other than farming, five per cent from

occupations indirectly associated with farming and the remaining 87 per cent had been associated with farming all their lives. Forty-three per cent of these men took over their farms from their fathers or fathers-in-law.

(c) Labour organisation. Fat-lamb farms are mainly one-man units, part-fattening farms are mainly two-man units, and the extensive farms employ one or more men on average. A total of 57 permanent men were employed on all farms, of which 35 per cent were members of the farmer's family. Part-time family labour was used on 12 per cent of the farms and casual labour on 50 per cent. Contract labour is important and is employed in some form on 95 per cent of the farms.

B. COUNTY FARMS

For the purpose of giving a description of farm-management practices in the county, the farms are divided into three groups as outlined on pages 9 and 12.

Group I.

1. General. This group comprises 63 farms on the Hatuma Hills and the flats and downs surrounding Hatuma Lake, an area of 27,119 acres. These farms are mainly (70 per cent) engaged in intensive fat lamb production and consist of relatively small units (carrying capacity 3-5 ewes per acre). As the units become larger the tendency is to use a greater proportion of Romney rams.

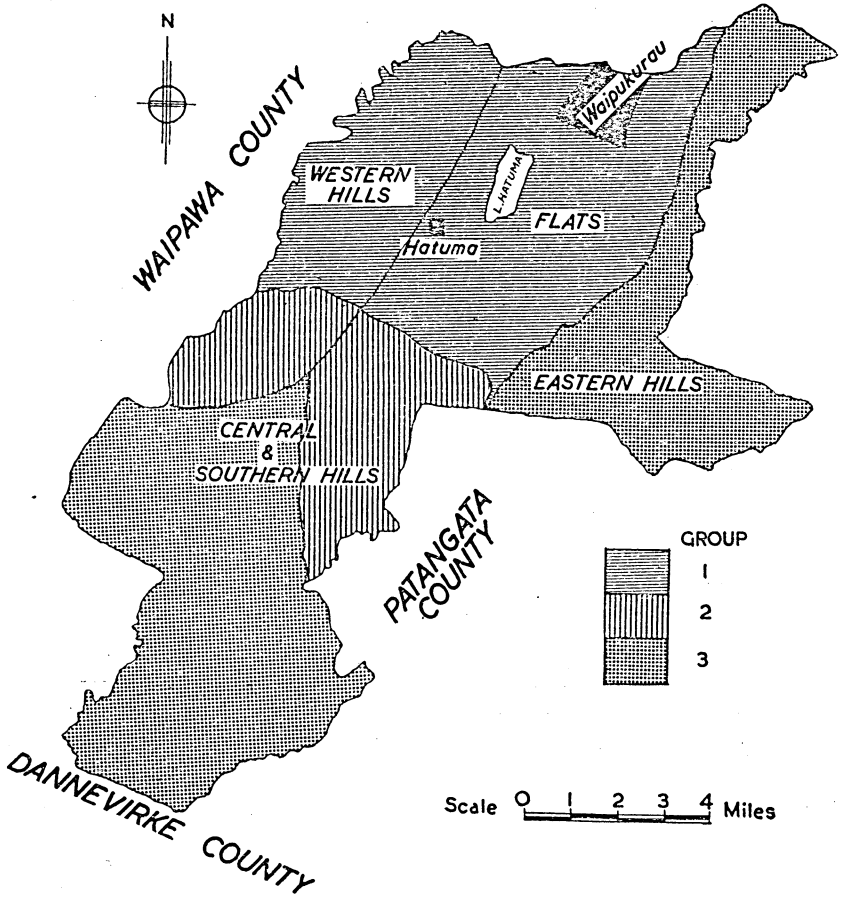
Table 4. Size of Farm in Relation to Breed of Ram Used on Group I Farms

Breed of Ram	No. of Farms	%	Average Size
Southdown—intensive fat-lamb farms	44	70	325 acres
Southdown and Romney—part fattening farms	9	14	456 „
Romney—breeding with some fattening	10	16	901 „
Total	63	100	434 acres

The 44 fat-lamb farms are taken as typical of this group. The ewes are all Romney on these properties and the rams are more than 95 per cent of the Southdown breed. Replacements, bought as two-tooth ewes or five-year-olds come mainly from the coastal hills.

2. Sheep management and performance. Rams are usually put out on 1 March but there is a variation between properties from 14 January to 14 March. Crutching is done from May to July (73 per cent in June). Many farmers pick out dry or late-lambing ewes in July and graze them separately. Dry ewes may be fattened early and sent to the works. Lambing is usually in early August with a 4 to

WAIPUKURAU COUNTY
Topographical Regions and Farm Groups



5 per cent loss in ewes. The general practice is to shed ewes at lambing from one or two mobs and set-stock all mobs from docking until weaning. The lambing percentage varies from 83 per cent to 117 per cent with an over-all average of 102 per cent. The shearing date varies from 28 September to 20 December, but the majority shear in late November. Practically no separate dry shearing is done in this group. All Romney lambs are shorn and though some Southdown-cross lambs have been shorn, this

is not normal practice. The wool weights (including fleece, oddments, crutchings, fly crutchings and dead wool) on fat-lamb farms carrying a high proportion of aged ewes, is 10 to 11 lb per ewe, going as high as 11¼ lb in flocks purchasing selected lines of two-tooths each year. In the Romney-breeding flocks the ewes clip up to 11½ to 12 lb and 9lb for hoggets. The aim on this class of country is to have wool of 44/46 count. On a per-acre basis, wool production varies from 31 lb to 70 lb per acre, with an average of 40 lb. Two properties running dry sheep are well above the average with 70 lb wool per acre. Lamb crutching is usually done immediately after the main shearing, or in some cases at weaning.

The first draft of fat lambs is taken from 1 November onwards. Most fat-lamb farmers send a draft of top lambs in early December. The weaning date varies from 7 December to 28 January but the majority wean at New Year, particularly if rape is used for fattening. About 40 per cent of lambs are fattened on the mothers. Eighty-seven per cent of farmers dose lambs at weaning and again up to four or five times according to season. On 57 per cent of farms, lambs are fattened solely on grass, with no cropping. The remaining 43 per cent of farmers put lambs straight on to rape or chou moellier after weaning. Lamb weights vary from 34 lb to 40 lb and average 35.5 lb, tending to be heavier on the lighter land. Production of lamb meat per acre on the fat-lamb farms varies from 66 lb to 168 lb with an average of 115 lb.

Ewes are culled within a fortnight of weaning for broken mouth, unsound udders and sometimes chronic footrot. In flocks buying two-tooth replacements an average of 16 per cent of the flock is culled and fattened annually, and those buying in five-year ewes cull up to 100 per cent. The production of ewe mutton varies from 30 lb per acre to 125 lb per acre, according to the age of replacement ewes. On 50 per cent of the fat-lamb farms, two-tooth replacements are used, 19 per cent use five-year ewes, 12 per cent buy in hoggets, and 19 per cent buy in anything from hoggets to five-year ewes. The annual ram-replacement rate is 20 to 25 per cent. Generally sheep are dagged prior to shearing and dipping; dipping is usually in February.

Only eight per cent of farmers dose ewes with nicotine bluestone, another four per cent dose any ewes low in condition, and two per cent use Ford's drench prior to tupping.

On 92 per cent of farms, ewes are fly-crutched prior to tupping. Forty-seven per cent of farmers make no special effort to flush ewes prior to tupping, the remainder try flushing if feed is available.

Footrot is the most serious stock problem on this class

of country and needs constant attention from weaning to lambing. Mortality in lambs between docking and sale is two to four per cent, and in ewes averages six per cent per annum.

3. Cattle management. Policies for cattle vary widely with the farmer, type of country and size of farm. The cattle-to-sheep ratio varies from 1 : 9 upwards and averages 1 : 37. Of the fat-lamb farmers 11 per cent run no cattle, 19 per cent take grazers mainly in summer and autumn, and 70 per cent buy in cattle for fattening.

4. Stock grazing. Cattle are used in a mob in spring and autumn and generally kept spread in mid-summer and winter. Thirteen per cent of farmers practise set grazing of sheep, 16 per cent intensive rotational grazing, and 71 per cent semi-rotational grazing, i.e., rotation from weaning till lambing only.

5. Supplementary winter feeding of stock. Thirty-two per cent of farms make no provision of supplements except for the purchase of three to eight tons of hay. Another 16 per cent grow no crop but cut or buy in significant quantities of hay, up to 20 tons per 1000 ewes. These two types may be classed as all-grass farming, typical of much of the Hatuma Hills region. The remaining 52 per cent grow chou-moellier, swedes or kale for ewes, or hoggets in the case of Romney-breeding properties. The feeding of the crop is started in May or June according to the season. Chou moellier is the most common crop and is grown at 15 to 22 acres per 1000 ewes. It is the typical crop of most of the heavier flats and downs.

6. Supplementary summer feeding. Chou moellier for winter feed is also generally used for lambs in autumn. Rape is the main summer crop, which, with chou moellier, is grown by 38 per cent of farmers. It is generally expected to fatten up to 25 lambs per acre on a reasonable crop. The most typical cropping rotation is, old grass → chou moellier → rape → new grass.

7. Pastures. All pastures are improved on the flats, and replaced every 12 to 37 years, the average being every 16 years. The mixture sown is 40 lb of perennial ryegrass, 3 lb white clover, and sometimes 1 lb of crested dogstail, 1 lb timothy, 1 lb Montgomery red clover, or 1 lb of subterranean clover on drier country. Two to eight pounds of cocksfoot may be sown in some cases. On heavy land it is desirable to sow pastures early in February. The majority of farmers aim to sow towards the end of March. Superphosphate as topdressing is used by all farmers in the group at an average of 1½ cwt per acre, on 30 to 90 per cent of the farm annually. The acreage so topdressed is over 60 per

cent of the property on fat-lamb farms and 35 per cent on the more extensive properties. Few farmers have a consistent policy for lime which was used by 48 per cent of farmers in 1950-51. Hay is cut on 20 per cent of farms. Paddocks for ryegrass seed are closed in mid-October and harvested in January. The main areas of ryegrass seed are saved on the flats and downs, and 1102 acres were closed by 48 per cent of the farmers. These men on average closed about eight per cent of their farm area. Yields vary from 15 to 30 bushels of machine dressed seed per acre (average 20 bushels), plus 20 to 90 lb of mixed clovers. It is not uncommon to harvest ryegrass off pasture 10 to 15 years old. Only 30 acres were closed for white clover seed, and 140 acres of ryegrass were stripped giving a yield of $1\frac{1}{4}$ to $3\frac{1}{4}$ bushels of machine-dressed seed per acre.

8. Labour organisation. The fat-lamb farms are mainly one-man units with some casual labour plus contract shearing, liming, harvesting, hay-baling and fencing. Frequently contract cultivation and top-dressing are also used.

Only 33 per cent of farms employed permanent labour. Of the 29 permanent men employed in this group, 50 per cent were on the 19 farms using Romney rams. Family labour is employed on 52 per cent of farms for periods of two to twenty weeks. Contract labour plays an important part; 84 per cent of farms shear by contract, 71 per cent crutch by contract; 24 per cent employ contract fencers, and 577 acres, or 40 per cent of all cultivation in this group, was by contract on 22 per cent of the farms. Contractors put on 46 per cent of the super used as topdressing and 60 per cent of the lime. Practically all hay (409 acres) was baled by contract, and 71 per cent of the ryegrass seed harvested was by contract.

Group II.

1. General. This group comprises 27 farms in the central region of the county, an area of 19,714 acres (see map). Part-fattening farms are typical of this group using both Romney and Southdown rams, breeding own replacements and selling most surplus lambs fat. The size of farm relative to the breed of ram shows the same trend as Group I.

Table 5. Size of Farm in Relation to Breed of Ram Used on Group II Farms

Breed of ram	No. of farms	Per cent of farms	Average size
Southdown . . .	4	15	522 ac.
Southdown and Romney .	17	65	671 „
Romney . . .	5	20	1271 „
Total . . .	26	100	763 ac.

All ewes are Romney and of the rams used on the 17 farms using both breeds, 69 per cent are Romney and 31 per cent Southdown.

2. Sheep management and performance. Generally speaking, this country is one to two weeks later than Group I for most farm operations which are the same as Group I. The carrying capacity is 1.4 to 3.4 ewes per acre (average 2.6). Lambing percentage varies from 74 to 119 per cent and averages 97 per cent. On 20 per cent of the farms, dry sheep are shorn towards the end of October, about a month prior to the main shearing. Wool weights are 10 to 10.5 lb for ewes and 6 to 9 lb for hoggets. Production of wool per acre varies from 10 lb to 37 lb with an average of 28 lb for the group. Southdown-cross lambs are crutched and Romney lambs shorn after the main shearing.

The first draft of fat lambs varies from 1 December onwards, and 62 per cent of farmers send the first draft at weaning. On some properties Romney lambs are left with the mother until February. The policy is generally to fatten all Southdown-cross and Romney wether lambs if possible. In 1950-51, 16 per cent fattened all surplus lambs, 16 per cent bought in stores, 63 per cent sold stores, and 53 per cent carried store hoggets through the winter. Lamb weights averaged 35 lb. Ewes are culled for mouth, constitution, udder, conformation and wool. Of the 17 part-fattening farms, 84 per cent breed sufficient replacement two-tooths, and 16 per cent have to buy in a proportion.

All properties fly crutch, usually early in March.

3. Cattle management. Cattle policies become more clear cut in this group: 58 per cent run a breeding herd, 27 per cent have a consistent buying-in policy and 15 per cent have no set policy, taking grazers if necessary. On some farms water and fencing are limiting factors with cattle. In general, cattle carrying on this class of country is higher than Group I, due to larger holdings, allowing more flexibility, higher rainfall, less improved pastures, and also cattle assist in hogget rearing, as they tend to be more healthy when run with cattle. The cattle-to-sheep ratio varies from 1 : 15 upwards. The average is 1 : 22.

4. Stock grazing. Cattle are used as in Group I. Four per cent of farmers use a rotational grazing system, 27 per cent set stock, and 69 per cent practise semi-rotational grazing.

5. Supplementary feeding of stock. Thirty-one per cent of farms had no provision for supplementary winter feed either as hay or crop. Sixty-nine per cent grew crops and some hay; crops were grown at 25 to 30 acres per 1000 ewes on average. Sixty-five per cent depend on pasture alone for fattening lambs.

6. Pastures and topdressing. There is a greater percentage of native species and more native pasture than in Group I. The majority of pastures are improved and hold ryegrass, white clover and subterranean clover with topdressing. Replacement of pastures where ploughable takes place every 12-25 years (17 years average).

Superphosphate was used as topdressing by 92 per cent of the farmers, covering from 12 to 50 per cent of their properties (average 36 per cent) at 1½ to 2 cwt per acre. Because of the hilly nature of the country, liming is not widely practised. Thirty-one per cent of properties used 1323 tons of lime, mostly at ½ ton per acre, in 1950-51.

A small amount of hay was saved on 20 per cent of properties, and 19 per cent closed paddocks for ryegrass seed.

7. Labour organisation. Of all the properties in the group 50 per cent employ permanent men and 15 per cent employ two or more men. Little or no casual labour is employed on these farms. Contract labour again plays an important part. Seventy-seven per cent of shearing, 69 per cent of crutching, 57 per cent of superphosphate sowing, 91 per cent of liming, and all harvesting, is performed by contract labour.

Group III.

1. General. This group comprises 21 properties on 34,687 acres (see map). This is Romney store breeding country with a carrying capacity of up to two ewes per acre. The same trends in type of farming in relation to size are followed in this group, as in Groups I and II.

Table 6. Size of Farm in Relation to Breed of Ram Used on Group III Farms

Breed of Ram Used	No. of farms	Per cent of farms	Average size
Southdown . . .	5	24	764 ac.
Southdown and Romney .	4	19	1281 „
Romney . . .	12	57	2433 „
Total . . .	21	100	1652 ac.

This country extends along the eastern margin of the county (see map), and includes the southern sector and the southern Turiri Range region. Because of the proximity to the market and presence of alluvial-silt flats in the north-east, much of this area is more intensively farmed than is typical of the group. The 12 Romney-breeding properties are taken as typical for the purposes of describing management. These properties put Romney ewes to Romney rams, about the middle of March.

2. Sheep management and performance. The lambing percentage averages 94 per cent for the whole group and

89 per cent for the Romney-breeding properties. Ninety per cent of the properties have a dry and a wet shearing. Dry stock, i.e., hoggets, rams, wethers and dry ewes, are shorn in October. The remaining ewes are shorn in early December. Ewes clip 10 lb wool, hoggets 6 to 7 lb, and lambs, 2.5 to 3 lb. Production varies from 7 lb of wool per acre on hard scrub country to 30 lb on some country in the north-east. The average is 20 lb. All Romney lambs are shorn either following the main shearing or sometimes at weaning, usually in late January.

Dosing of lambs is carried out regularly by 52 per cent of farmers, 14 per cent dose ewe-lambs only and 34 per cent do not dose at all. Where stores are to be sold, dosing is not important. On the 12 store properties 5 to 40 per cent of the total lambs docked were sent away as fats, and 60 per cent of these farmers sold shorn wether lambs, totally 2775. In all cases ewe lambs are carried through the winter and in 25 per cent of cases wethers were carried as a general policy and sold as two-tooths or four-tooths.

Two-tooth ewes are culled, firstly for constitution, then wool and conformation. Between 25 and 35 per cent of two-tooths were culled. On all Romney-breeding properties five-year ewes are culled on age-mark. Mortality in ewes is six to ten per cent and in hoggets three to four per cent.

3. Cattle management. Those properties with no breeding herd (43 per cent) have definite buying-in policies, usually purchasing $1\frac{1}{2}$ to 2-year stock, holding for two years and selling fat at $3\frac{1}{2}$ to 4 years in the autumn or spring. The cattle to sheep ratio varies from 1 : 7 to 1 : 24 with an average of 1 : 16. Typically six breeding cows are run per 100 acres. In all but one case the breed is Aberdeen Angus. The bull is put out at the end of November at one to 45 cows; weaning is in May or June, calving is in August and September, with calf marking in October. The calving percentage is 80 to 85. Normally all heifer calves are kept and culled at 1 to 2 years on constitution and conformation, and 20 to 30 per cent of the breeding herd are heifers. On larger properties culling of cows is on age-mark at 6 to 7 years. Because of the climate and liability to droughts and excessively wet seasons the cattle policy must be flexible; hence no typical policy can be set down.

4. Grazing management of stock. Cattle are used in mobs, generally not exceeding 50, in the spring and autumn, and spread over the farm in winter. The properties being more extensive than those in Groups 1 and II, there is no rotational grazing, and more set stocking, i.e., 24 per cent.

5. Supplementary feeding of stock. Sixty-two per cent of farms grew winter crop at an average of 12 acres

per 1000 ewes and used it mainly for hoggets. The remaining 38 per cent rely on an all-grass economy with some hay and chaff bought in. Sixteen per cent grew rape as a summer crop.

6. Pastures. Twenty-eight per cent of the area in this group is in native grass, 42 per cent in improved pasture and the remainder scattered scrub, scrub and unproductive. There has been a considerable increase in top-dressing of this country with development of aerial sowing. Only 20 per cent of farmers used lime, as the topography and distance of cartage are limiting factors. Hay is grown on 10 per cent of properties.

Table 7. Summary of Farm Details on Groups I, II and III

Details	Group 1	Group II	Group III	Total
Soil sub-groups	1 and 2	3 and 5	6-9 and 13	
Soil types (Nos.)	29, 30	28, 28A, 28D, 28E	27, 20	
General description	Intensive fattening country	Part fattening country	Extensive store breeding country	Sheep country
Carrying capacity	3-5 ewes per acre	2-3 ewes per acre	½-2 ewes per acre	
No. of farms	63	27	21	111
Percentage of total farms	57	24	19	100
Area (acres)	27, 119	19, 714	34,687	81,420
Percentage of total area	33	24	43	100
Average farm area (acres)	434	763	1652	733
Topography	Flat to rolling	Rolling to hilly	Rolling to steep	
Rainfall	33-37"	37-45"	37-55"	
Unimproved value	£15-£25 per acre	£10-£15 per acre	Up to £10 per acre	
Lambing percentage	102	97	94	
Average fat - lamb weight	35 lb	35.5 lb	—	
Lamb-meat production	120 lb/acre	40 lb/acre	—	
Dry shearing	—	—	October	
Wet shearing	November	November	November	
Wool per ewe	10-11 lb	10 lb	10 lb	
„ „ hogget	8 lb	6-7 lb	6-7 lb	
„ „ lamb	—	—	2.5-3 lb	
„ „ acre	40 lb/acre	28 lb/acre	20 lb/acre	
Ewe mortality	6%	7%	7-10%	
Hogget mortality	—	—	3-4%	
Percentage of all-grass farming	48	31	38	
Area of winter feed per 1000 ewes	15-22 acres	25-30 acres	12 acres	
Cattle-to-sheep ratio	1 : 37	1 : 22	1 : 16	
Breed of ram used	Southdown	Southdown and Romney	Romney	

7. Labour organisation. The properties in this group are two-man units or more, the largest being a six-man unit. Casual labour is used on 57 per cent of properties. Contract labour is important for shearing, crutching, fencing, cultivation, giant discing, bulldozing, scrub cutting, liming and topdressing.

C. COMPARISON AND ANALYSIS OF FARM MANAGEMENT PRACTICES ON COUNTY FARMS

In the following analysis the physical production of meat and wool per acre, per-ewe equivalent and per-labour unit, is used as an index of comparison. The factors affecting production may be divided into two groups, first, uncontrollable factors such as soil type and climate, and second, controllable factors such as subdivision, size of farm, grazing management, topdressing, supplementary feeding, labour organisation and farm layout. It is difficult to put any empirical rating on many of these factors, but four which can be measured have been selected as indices of comparison between farms.

1. Area of farm.
2. Area topdressed as a percentage of total farm area.
3. Area limed as a percentage of farm area.
4. Area of hay and supplementary feed as a percentage of farm area.

General analysis on the basis of wool production

Table 8. Analysis of 94 sheep farms, according to carrying capacity, showing wool production, topdressing, liming and supplementary feeding.

EE† per acre	Farms		Wool lb			E.E.† per acre	Average Farm Area	Percentage of Farm		
	No.	%	Per acre	Per EE†	Per LU*			T.D.‡	Limed	Hay & Winter forage crop
0-2	10	11	17	12.1	14,723	1.4	2,432	27	4	2.2
2-3	28	30	27	10.8	12,745	2.5	696	31	4	3.9
3-4	36	38	36	10.6	10,849	3.4	579	52	11	4.2
4-6	20	21	47	10.4	10,657	4.5	335	60	16	4.4
Average	94	100	34	11.0	10,933	3.1	766	36	7	3.7

† Ewe equivalent. No attempt has been made to convert cattle to E.E.
* Labour unit.
‡ Topdressed with superphosphate.

1. Carrying capacity. Table 8 shows that as carrying capacity increases, production per EE decreases. The reasson for this is that on the country of lower carrying-

capacity, a higher proportion of young sheep are carried and these clip more wool. The output per labour-unit also tends to decrease as carrying capacity increases, due to the more intensive sheep management, smaller units and development of side lines on the country of higher carrying-capacity. The farms of high carrying-capacity do more topdressing, more liming, and have a larger proportion of the farm in hay and fodder crops. Production per acre naturally tends to increase with increasing carrying capacity, while size of farm decreases.

Table 9. Analysis according to wool production per acre.

Wool, lb per acre	Farms		Wool lb			E.E.† per acre	Average Farm Area	Percentage of Farm		
	No.	%	Per acre	Per EE†	Per LU*			T.D.	Limed in	Hay & Winter feed crop
Under 20	12	13	17	10.0	13,620	1.7	2,034	25	1	2.5
20-30	26	27	26	10.0	12,189	2.6	934	43	10	3.5
30-40	28	30	36	11.3	11,661	3.2	513	48	3	4.9
Over 40	28	30	46	11.5	10,681	4.0	349	55	19	4.1
Average	94	100	34	11.0	10,933	3.1	766	36	7	3.7

* Labour unit.
† Ewe equivalent.

2. Wool per acre. Wool per acre is closely related to carrying capacity. The analysis in Table 9 therefore shows much the same trends as in the case of carrying capacity.

Table 10. Analysis according to wool production per labour-unit.

lb Wool L.U.*	Farms		Wool lb			E.E. per acre	Average Farm Area	Percentage of Farm		
	No.	%	Per acre	Per EE	Per LU			T.D.‡	Limed	Hay & Winter crop
Under 10,000	36	38	37	10.3	8,013	3.6	461	54	13	4.6
10-13,000	30	32	34	11.0	11,799	3.1	683	47	10	5.0
13-16,000	12	13	33	11.8	14,732	2.8	1,102	34	9	2.2
Over 16,000	16	17	25	10.4	17,531	2.4	1,480	33	2	2.7
Average	94	100	34	11.0	10,933	3.2	766	36	7	3.7

* Labour unit.
‡ Topdressed with superphosphate.

3. Wool per labour unit. In assessing labour on farms, cadets have been counted as equivalent to three-quarters of a male labour unit, and casual labour is assessed according to the number of weeks employed. The farms show a wide variation in output per labour unit. In some cases this is affected by the stage of development of a property. Again, the analysis shows much the same trends as shown in tables 8 and 9.

General Analysis on the basis of fat lamb production.

1. Carrying capacity.

Table 11. Analysis of 46 fat lamb farms, for weight of lamb produced, according to carrying capacity.

E.E. per acre	Farms		lb of Lamb			C.C. E.E. per acre	Average farm area (acres)	Percentage of Farm		
	No.	%	Per acre	Per L.U.	Per E.E.			T.D.	Lime	Summer feed crop
2-3	10	22	85	32,351	32.69	2.6	799	40	8	1.64
3.1-4	24	52	111	28,761	31.71	3.5	367	59	12	2.07
4.1-6	12	26	124	25,647	26.95	4.6	263	72	22	2.73
Average	46	100	109	28,730	31.14	3.5	434	58	12	2.20

The figures in this table follow the same pattern as tables 8 and 9 above, i.e., as carrying capacity increases, production per acre and percentage of farm topdressed, limed and in summer crop also increase. Total area, production per labour-unit and per ewe-equivalent all decrease.

2. Lamb per acre.

Table 12. Analysis of 46 farms, for fat lamb production, according to production of lamb per acre.

Lamb Production lb per acre	Farms		Lamb lb			C.C. E.E. per acre	Average farm area (acres)	Percentage of Farm		
	No.	%	Per acre	Per L.U.	Per E.E.			T.D.	Limed	Summer fattening crop
75-100	16	35	86	30,065	29.66	2.9	666	45	7	1.76
100-120	12	26	107	29,546	27.44	3.9	367	72	13	2.67
121-150	18	39	131	26,999	32.95	4.1	272	60	17	2.28
Average	46	100	109	28,730	31.14	3.5	434	58	12	2.2

This table shows the same trends as table 11 except that production per ewe-equivalent increases with increasing production per acre, a reverse of the trend in that table.

Output of Lamb per Labour-Unit.

Table 13. Analysis of 46 farms for lamb production according to lb of lamb per labour-unit.

Production lb per L.U.	Farms		Lamb lb			C.C. E.E. per acre	Average farm area (acres)	Percentage of Farm		
	No.	%	Per acre	Per L.U.	Per E.E.			T.D.	Lime	Summer crop
Up to 25,000	16	35	121	21,861	29.5	4.1	284	61	18	2.3
25-30,000	12	26	101	27,145	28.0	3.7	376	59	11	1.41
30-35,000	6	13	90	30,674	32.1	2.8	505	32	3	3.4
35-50,000	12	26	109	38,502	32.5	3.35	657	67	8	2.1
Average	46	100	109	28,730	31.1	3.5	434	58	12	2.2

This table shows an ascending output of fat lamb per labour-unit as size of farm increases. It also shows that in the group where output per labour-unit is highest, production per E.E. is also highest and topdressing greatest. The per-acre production is however highest in the group where production per labour-unit is lowest. There are, however, insufficient numbers in some groups and variations in individual efficiency of management overshadow what might be trends.

Comparison with similar survey data for Waipa County.*

The factors influencing trends of production in Waipa (dealing with dairy farms only) follows the same pattern as in Waipukurau (dealing with sheep farms only), with the exception of production per labour-unit. In Waipa as the farm area decreased, carrying capacity and production per acre increased, and production per labour-unit increased up to a point, whereas in Waipukurau production per labour-unit decreased with decreasing area. See Table 14.

However, it will be seen from the table that on dairy farms carrying above 80 cows per 100 acres, the production of butterfat per labour-unit starts to decline. It is likely that if the farms carrying over 80 cows per 100 were further analysed, they would show the same trends in production per labour-unit as was found on sheep farms.

Summary

From physical measurements of lamb and wool production, it was found that as carrying capacity increased: (i) size of farm, production per labour-unit and per ewe-equivalent decreased; (ii) production per acre, per cent of farm topdressed, limed, and in hay and fodder crops increased; (iii) there was increasing use of the Southdown ram and decreasing incidence of set stocking.

D. CONCLUSIONS

The following impressions are gained as a result of meetings with farmers and after discussion and analysis of the data collected.

1. Farm-management practices.

(a) Type of farming. This is governed largely by soil and size of farm. If small, the farm is best farmed as a fat-lamb proposition with maximum development of sidelines, such as small seeds, or dealing in stock if handy to the yards. Large properties on good soil have, with the past seven-year average prices and costs, shown Romney breed-

* "Dairy Farming in Waipa County." By W. M. Hamilton and K. J. Mitchell. Proceedings of the Ruakura Farmers' Conference Week, 1951.

Table 14. Analysis of production per acre on dairy and sheep farms, to compare production of butterfat per labour unit on dairy farms with production of lamb and wool per labour unit on sheep farms.

DAIRY FARMS[1]					SHEEP FARMS[2]					FAT LAMB FARMS[3]				
Cows per 100 acres	% of farms	B.F.† per L.U.*	B.F.† per acre	Average Farm area ac.	E.E.‡ per acre	% of farms	Wool per L.U.*	Wool lb per acre	Area acres	E.E.‡ per acre	% of farms	lb of lamb per L.U.*	lb of lamb per acre	Area acres
10-39	6.4	5450	70	140	0-2	11	14,723	17	2432	2-3	22	32,351	85	666
40-59	38.2	7300	121	116	2-3	30	12,745	27	696	3-4	52	28,761	111	367
60-79	49.8	7800	163	91	3-4	38	10,849	36	579	4-6	26	25,647	124	272
80 +	5.6	7350	208	59	4-6	21	10,657	47	335					
Average	100.0	7450	138	102	3.1	100	10,933	34	766	3.5	100	28,730	109	434

1 From Waipa County Survey.
2 From Table 8.
3 From Table 11.

‡ Ewe Equivalent.
* Labour Unit.
† Butterfat.

ing to be at least as profitable as fat-lamb production. On the lighter soils, Romney breeding is the most suitable type. Fat-lamb production on this type of country without an area of alluvial silt, requires exceptional managerial ability.

(b) Topdressing. On the better class of country (Groups I and II) about 66 per cent of the area topdressed annually should give good returns. Up to 100 per cent may be desirable on heavier land. On the more extensive country where large tonnages of superphosphate are required if a high percentage of the area is to be topdressed, finance is a limiting factor. As a general rule superphosphate should be used at about 1½ cwt per acre on the greatest possible area of the farm which finance will allow, and always on the best pastures first.

(c) Liming. A regular liming policy is desirable if lime and contractors are available. Much of the country responds to lime, and on the easy country within eight to ten miles of the lime works, the rate should be one ton of lime per acre, over the whole farm as an initial dressing, followed by half a ton per acre every five years, or less. Liming on the extensive country depends on topography, finance and distance from works.

(d) Supplementary feeding. As a general rule the growing of rape for fattening purposes and chou moellier for winter feed, at a total of 20 to 25 acres per 1000 ewes, with regular pasture renewal is a sound practice. It allows a margin for fattening of lambs and for winter feeding in the event of any carry-over of stock. On the other hand on some of the limestone country, if regularly topdressed, good pastures will last 15 years or more. In such cases expenditure and labour can be reduced by adopting an all-grass policy with only occasional ploughing. A reserve of hay should be kept. An area of lucerne would be an advantage on all country where the roots can get down to water. It would provide hay, and grazing for cattle in a dry summer. On the extensive country, winter crops are necessary for hoggets, and as a reserve for ewes if stocked to full capacity. There is a tendency for this country to be understocked because of climatic variations affecting grass growth.

(e) Cattle. On the highly-improved intensive country, cattle are not generally necessary to control pastures but are possibly a factor influencing health of sheep. In general it is considered good practice to run and fatten cattle on this country even to the extent of taking sheep feed, at a ratio of at least one cattle beast to 30 or 40 sheep. As the farming becomes more extensive and the rainfall increases, cattle become increasingly important. On the store country, cattle should be run at a ratio of 1 : 7 sheep or even

1 : 5 on the higher rainfall areas, providing the country is not too broken. A breeding herd appears to be good practice on any property in Groups II or III of over 500 acres, at the rate of one cow to 20 ewes, keeping replacements according to needs and season.

(f) Grazing management. On average, semi-rotational grazing is the most satisfactory, with use of cattle in mobs in spring and autumn to control flush growth. On some small intensive farms, maximum gross production has been obtained by rotational grazing of sheep alone.

Size of farm.

This is measured by the number of ewes. As defined by the Sheep Industry Commission, an economic unit was considered to be 800 ewes for a fat-lamb farm and 1000 ewes for a store property. If the aim is to increase gross production, then the smaller farms appear to have a higher production per acre. If production per labour-unit is a more important factor, then the opposite applies. In considering size of farm and subdivision, the management factor is over-riding and all-important. The advantages and disadvantages of subdivision depend on management. Under a good manager, a large property is generally a more efficient unit than a small one.

On average, Group III country is best handled in large blocks, with large numbers of sheep and cattle. Group I country, if run in large blocks, requires above average management ability.

Land development and increased production.

This depends on the following factors:

(a) Availability of finance. This is dependent on the relative costs of farm materials and prices of meat and wool. Taxation also has a very important effect. The effect of taxation on production is impossible to assess. However, it can be said that land, income and estate taxation does take money out of farming. If this money were allowed to accumulate in the balance sheet and was taxed only if drawn for private purposes it could very greatly assist the financing of development on many farms. There was no case of farmers being granted assistance for development under the Marginal Lands Act.

(b) Availability of materials. The most important material is superphosphate, followed by fencing materials and lime. In the hill country if aerial topdressing is maintained (or increased) at the present rates, carrying capacity and production should increase. The response to superphosphate is greatest on the better soils. However on much of the lighter hill country superphosphate is necessary to prevent reversion to scrub. Hence in event of a superphos-

phate shortage the problem arises of where it should be applied.

(c) Availability of labour. On all classes of country there is a large demand for contract labour of all types. There is increasing demand for motor-transport operators, lime contractors, fencers, and cultivation contractors and bulldozers, particularly for giant discing, swamp ploughing, and roading on inaccessible country.

With labour and materials available, and finance available to buy them, there should be a rapid increase in production, particularly from the country in Groups II and III.

(d) Topography of the country. Where the country can be ploughed or disced, scrub can generally be controlled and improved pastures established and maintained by top-dressing. There are over 10,000 acres of scrub or scattered scrub, much of which could be brought into production.

(e) Capital cost, maintenance and depreciation of machinery. These costs are high on hill country where scrub is being controlled. The amount spent appears to depend largely on the availability of finance.

(f) Distance from the rail. This affects the development of some of the more remote hill country, as the cost of transport of materials such as superphosphate and lime is a large item in total costs. To assist financing of development, a method of payment of subsidies on all transport exceeding a certain mileage might be organised.

(g) Weeds and pests. Rabbits, if kept at the present level will not materially affect production. In a few cases the eradication of rabbits would enable increased carrying of stock.

Weeds affect all classes of country and their eradication would increase production. Scrub has been fully discussed. The eradication of barley grass is likely to have an important effect on the production of the better-class country. All weeds may be said to affect production to some extent.

(h) Drainage. The drainage and flood problem over 2,000 acres of good flats around Hatuma Lake appears at present to be without practical solution.

(i) Size of farm. The effect of size of farm on production is mentioned above, i.e., smaller units result in greater gross production but give lower production per unit of labour.

(j) Land tenure. The system of tenure of some Maori land is unsatisfactory from the point of men wishing to develop land. An improvement in the terms of lease is necessary in most cases if the tenant is to develop the land with confidence.

Land Settlement

The possibility of further settlement in this county is a matter of speculation only. There are blocks of land on all classes of country which could be subdivided by the owners and the Government. There were 22 subdivisions between 1945 and 1952. An important feature in subdivision is that units should not be too small, particularly on the lighter store-sheep country where improvement is limited. The Government is at present developing a block of 2,350 acres for settlement. There are also notable cases of the development of scrub country by individuals. This should ultimately result in closer settlement.

ACKNOWLEDGMENTS

I wish to acknowledge the splendid co-operation of the farmers in Waipukurau County, and particularly those four who kept costing diaries. Thanks are also due to the accountants, fat-stock buyers, and officers of stock firms and freezing works for their willing co-operation. Appreciation is also extended to the staff of the New Zealand Meat and Wool Boards' Economic Service for their assistance, and to the following Government Departments: Valuation, Lands and Survey, Agriculture, Census and Statistics and Soil Bureau of the D.S.I.R.

Finally I thank members of the departments of Economics and Farm Management and Valuation of Lincoln College (particularly Dr I. W. Weston and Mr H. E. Garrett) for their supervision of my work.

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