AGRICULTURAL
ECONOMICS
RESEARCH UNIT

Lincoln College

LIVESTOCK TARGETS IN NORTH CANTERBURY HILL COUNTRY: THE IMPACT OF CHANGING PRICES

by

J. L. MORRIS, H. J. PLUNKETT
and R. W. M. JOHNSON

Research Report No. 51

1968

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P R E F A C E

This Report continues the recent series of publications that the Agricultural Economics Research Unit has brought out on the implications of the 1964 Agricultural Development Conference.

Livestock targets were drawn up by the Conference as an indication of the likely growth of the New Zealand Agricultural Industry by 1972. Trends in livestock numbers were first estimated by the Department of Agriculture in 1963; the Agricultural Development Conference modified these estimates when it became clear that a faster rate of expansion would be necessary. These new levels of livestock numbers required in 1972 became the national livestock targets. The Conference considered that the greatest increase in stock numbers would come from undeveloped hill country.

Since the targets were first prepared, however, wool prices have declined substantially, and there is now some uncertainty about future rates of increase and types of livestock to be employed. To obtain greater information on this aspect of the targets, the survey reported here was initiated during 1967. The resulting report examines the livestock targets in the context of all hill country farms in Cheviot County which is typical of much of this class of land in North Canterbury.

Once again we would like to express our special thanks to the farmers of Cheviot County for their willing co-operation in completing the field survey. The project was supervised by Dr R.W.M. Johnson; the survey work was carried out by Messrs Morris and Plunkett, and Miss J. Habgood was responsible for the map work.

B. P. Philpott

Lincoln College,
October 1968.

C O N T E N T S

LIVESTOCK TARGETS IN NORTH CANTERBURY HILL COUNTRY : THE IMPACT OF CHANGING PRICES

I. INTRODUCTION

The Agricultural Development Conference, in presenting the national livestock targets for 1972, laid considerable emphasis on the role of the hill country in meeting the targets. It was thought that the flat country and lower hill country was already near full production and that the greatest potential for increases in carrying capacity lay in the large areas of steeper hill country where the techniques of aerial top-dressing and oversowing were being rapidly introduced. Cheviot County in North Canterbury is representative of this class of land, where the valley floors and easy hills had been ploughed and sown with improved pastures in the past, but where the steeper country still remained in the natural tussock cover.

This survey of Cheviot County was carried out in the summer of 1967/68 to ascertain what progress had been made in reaching the targets set by the Agricultural Development Conference and to find out how development plans and objectives were being modified in the light of falling prices for medium-fine wool and store stock. The technique employed was to divide the hill country farms in the County into their respective soil types, and then to estimate the stock increase that was projected using the Development Conference estimates of future carrying capacity for each soil type. This projected

stock increase for the years from 1965 to 1968 could then be compared with the stock increases actually achieved in this period. Secondly, farmer estimates of further increases from 1968 to 1971 were collected to obtain a preliminary estimate of changes that were likely to take place in the remaining portion of the Agricultural Development Conference projection period.

DESCRIPTION OF AREA

Cheviot County is approximately 327 square miles in area and is centred on Cheviot township about 74 miles north of Christchurch on State Highway 1. For the length of the county, from south of the Blythe River to the Conway River in the north, there is a narrow belt of coastal hills rising up to approximately 2000' (see map). These hills are dissected by the Blythe, Hurunui, Jed and Waiau Rivers. West of this range there are low rolling downlands interspersed with small plains around Spotswood, Cheviot and Domett. Further inland is more hill country up to about 1500', consisting of the Cheviot Hills together with the valleys of the Kaiwara, Gower, Waiau and Leader Rivers. The western boundary of the county is the Lowry Peaks range with grazing country up to 3000'.

The rainfall in Cheviot County is typical of the North Canterbury area. The rainfall averages 30" at Cheviot, 35" in the Leamington valley west of the township and approximately 40" north of the Waiau River.[1] However, this is subject to

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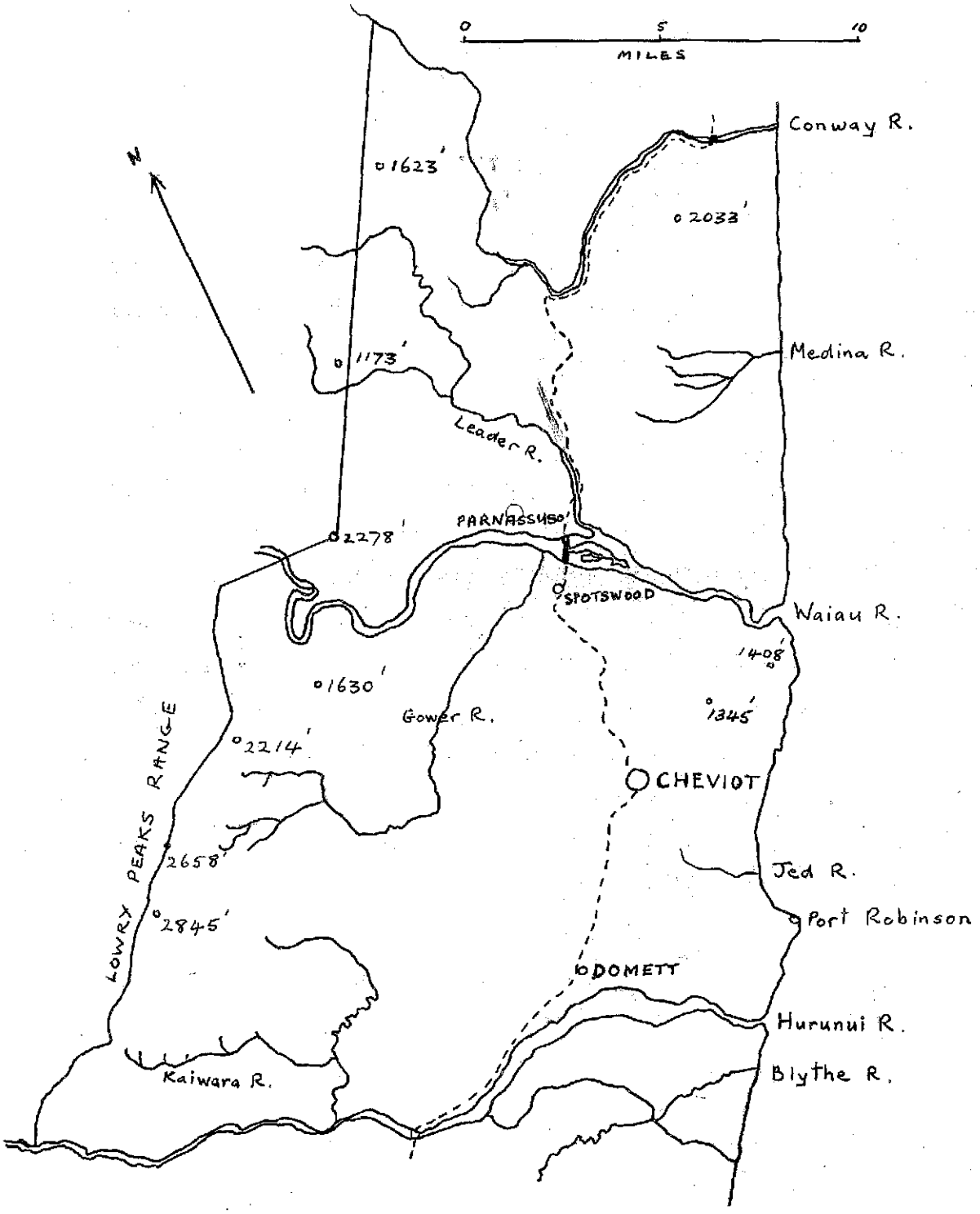
1 B.C. Withell, Farm Advisory Officer, Cheviot, pers. comm.



Cheviot County, North Canterbury.

marked fluctuations both between and within years. The area experiences the north-west föhn wind and summer droughts may be expected. Winters are moderate and on most of the area snow is not normally a problem.

Access is good in most of the area and only one farm was further than thirty miles from Cheviot township. Most of the roads are good. The South Island main trunk railway runs through the county with ten stations and sidings.

HISTORICAL BACKGROUND

The "Cheviot Hills" pastoral run was taken up on a leasehold basis by J.S. Caverhill in 1849.[1] However, the Hon. William Robinson made application at the Provincial Land Office, Nelson, to purchase a portion of the block on freehold terms and succeeded gradually in acquiring the whole area. In May 1856, Robinson applied for the freehold of a block approximately 12 miles square bounded by the Waiau River in the north, the sea in the east, the Hurunui River in the south and the Kaiwara stream and a "right" line along the eastern slopes of the Lowry Peaks Range as far as the Waiau River to the west. Caverhill's tenure of this land ceased when Robinson freeholded the area. Robinson built, fenced and made extensive improvements.

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[1] W.J. Gardner. "The 'Purchase' and Subdivision of Cheviot Hills 1892-3 : A Turning Point in N.Z. Land Settlement History Re-examined" - Address to Historical Association of Canterbury, 15 March 1966.

"Under William Robinson 'Cheviot Hills' had a reputation second to none for the quality of its flock (the largest in the colony in 1885) and for its fine buildings, fences, plantations and other improvements. Isolated from trunk roads and from railways, but possessing its own efficient outlet in Port Robinson, the estate was a self-sufficient pastoral kingdom, its owner and its wealth a colonial legend."[1]

The Cheviot Estate was the first area in New Zealand where the Crown was forced to purchase under the Land and Income Assessment Act of 1891. On the 19th April 1893 the conveyance for Cheviot Hills was signed at the Trustee's Valuation of $520,440. During 1893 and 1894 the estate was subdivided and sold mainly as freehold grazing farms ranging from 88 to 2089 acres in size, as well as in various other forms of tenure such as pastoral leases, leases in perpetuity, grazing licences etc. Some blocks offered were not applied for in the original ballot and adjoining landholders had the right to the grazing of these blocks. This practice carried on until the end of the First World War when these blocks were resettled by soldiers. Following the Second World War the still substantial remaining "Cheviot Hills" holding was acquired by the Crown for resettlement. The "Blytheburn" and "Lowry Hills" holdings were also split up for rehabilitation of returned servicemen at this time. The present Cheviot County, besides containing the original "Cheviot Hills" run also includes parts of the "St Leonards", "Parnassus", "Hawkswood" and "Stonyhurst" runs.

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[1] The Cheviot Estate. Particulars, Terms and Conditions of Sale and Lease. Government Printer, 1894.

THE 1968 SURVEY

According to the Agricultural Production Statistics there are 207 holdings over 10 acres in Cheviot County. In the previous survey of farm labour in the county 136 farms over 100 acres which had a potential for employed labour were visited.[1] In the present survey, 61 properties which were described by their owners as hill country farms were visited. The total area of these 61 farms was 147,998 acres. However, 10,837 acres of this, while associated with properties in the county and included in the survey, were outside the County boundaries. Thus approximately 66% of the county area is represented in the survey. The average farm size was 2,426 acres, with a range from 400 acres to 25,000 acres.

The soils[2] in the survey area, being on hill country, tend to be skeletal with only moderate natural fertility. Approximately 50 per cent consists of steepland and steeper hill soil Yellow-Grey Earths (YGE) of the Haldon and Amberley hill series and Yellow-Brown Earths (YBE) of the Hurunui series in the higher rainfall areas north of the Waiau River. The remainder of the area is largely rolling land and easier hill country YGE's - predominantly of the Leader, Amberley, Cheviot and Gower types, with areas of YBE - YGE intergrades, some hill country limestone derived rendzina soils together with small pockets of recent, and recent gley soils in the river valleys.

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1 J.L. Morris and R.G. Cant, "The Nature and Extent of the Farm Labour Shortage in Cheviot County, Canterbury", Agricultural Economics Research Unit Publication No.38, 1967, p.6.

2 From sheet 6 of the Soil Map of the South Island, New Zealand, published by the Department of Scientific and Industrial Research, 1964.

The topography of the survey area is indicated in Table I.

TABLE I

Topography of Survey Area

Class	Area (acres)	Percentage of Total
Ploughable area	17,989	12.1
Extra area discable	26,289	17.8
Unploughable area	103,720	70.1
Total	147,998	100.0

The present surface cover is given in Table II.

TABLE II

Present Cover of Survey Area

Cover	Area (acres)	Percentage of Total
Sown pasture	26,619	18.0
Oversown & topdressed pasture	40,309	27.2
Native tussock pasture	71,553	48.3
Manuka scrub, gorse, Matagouri & broom	4,239	2.9
Bush	3,213	2.2
Swamp & other waste land	593	0.4
Cereal crops	308	0.2
Forage crops	1,164	0.8
Total	147,998	100.0

Both these tables are based on figures given by individual farmers. It is likely that with improved technology and experience the area considered discable in Table I could increase considerably.

From Table II it will be seen that cash cropping is not significant - only 0.2% of the area being in cereal crops, a proportion of these being for grain feeding of stock. Forage crops, which occupy only 0.8% of the total area, are of only minor significance.

The survey area is good class native tussock hill country, which in the past was devoted mainly to store sheep raising. However, with pasture improvement through aerial topdressing and oversowing, together with some cultivation, the amount of stock being fattened has increased markedly. The Corriedale and, to a lesser extent, the Halfbred, are the sheep breeds which are favoured on this class of country. Most farmers breed their own ewe replacements and sell fat lambs, some store lambs, cull two tooth ewes and old ewes. The area is suitable for running beef cattle. Cattle policies vary but many farmers run breeding cows and sell weaners, although with pasture improvement an increasing number are retaining their own steer calves for fattening. Cattle numbers are increasing, although fencing, and, more especially, water supply, are limiting on much of this hill country. However, an extensive water supply scheme is at present being installed and this should lead to a considerable increase in stock numbers, particularly cattle. Mr B.C. Withell,[1] the Department of Agriculture Farm Advisory Officer in Cheviot has estimated that a 300 per cent increase in cattle numbers is possible when the water scheme is completed. While natural creeks and springs, which are found on this country are adequate for sheep, they are often trampled by cattle and are thus unsatisfactory.

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[1] Pers. comm.

The present stock numbers for the survey area and the total County are shown in Table III.

TABLE III

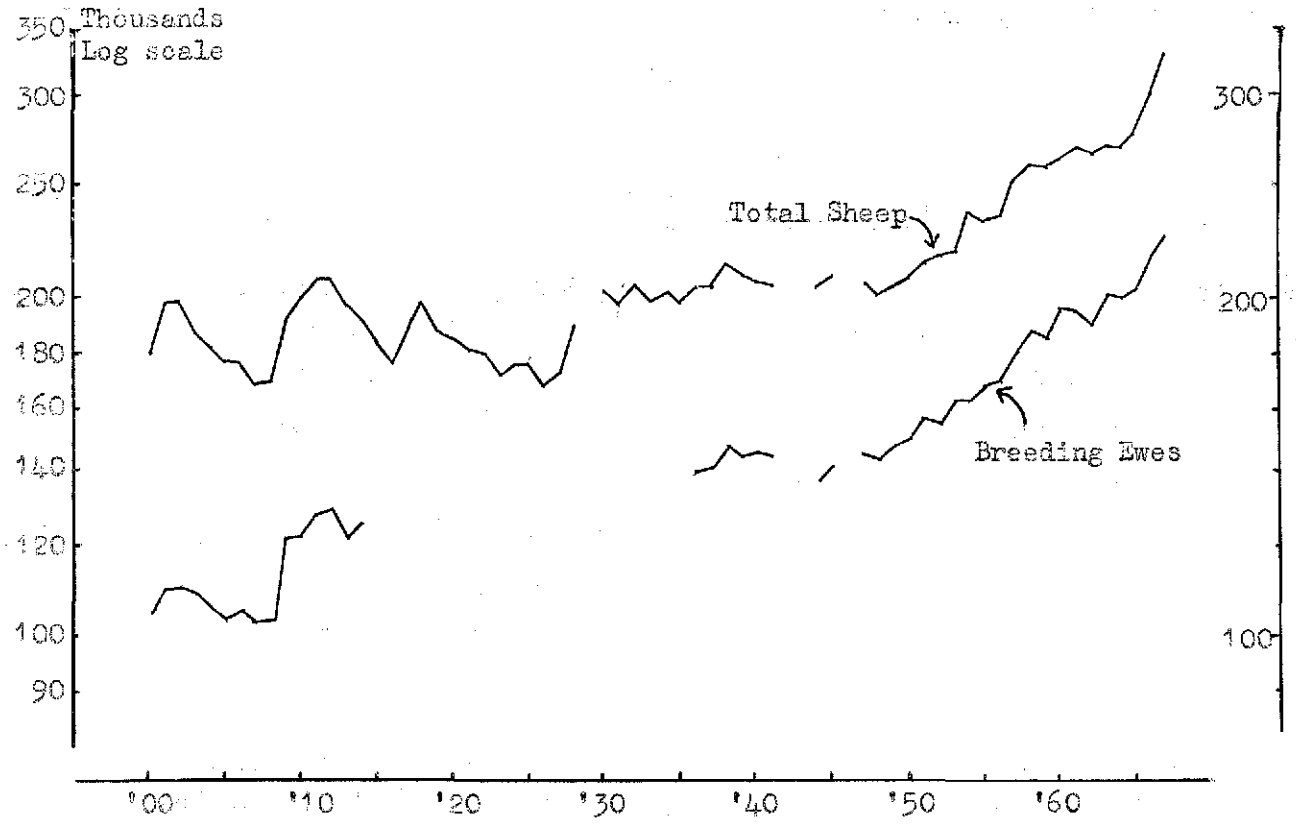
Stock Carried in 1967

Sheep:	Survey (June '67)	County (June '67)
Breeding Ewes	130,117	230,593
Ewe hoggets	49,318	75,935
Wethers (incl. w.hoggets)	12,756	21,841
Rams	3,213	5,137
Other	1,058	1,754
Total Sheep	196,462	335,260

Cattle:	Survey (Winter '67)	County (Jan.31 '67)
Breeding cows	6,460	6,881
Rising 2 yr. heifers	741	1,288
Rising 1 yr. heifers	1,796	2,487
Rising 2 yr. steers	753	1,316
Rising 1 yr. steers	1,135	2,631
Bulls	204	233
Other (incl. dairy cows)	134	753
Total Cattle	11,223	15,589

The survey area carried 58 per cent of the sheep in the county and approximately 90-95 per cent of the beef breeding cows (total cattle numbers are not comparable because of the date of the respective enumerations). There were in 1967 about 17.5 sheep to every head of cattle in the survey area.

FIGURE I SHEEP AND EWE NUMBERS CHEVIOT COUNTY 1900-1967



Sheep have always been the most important source of income in the county, but cattle numbers have been changing much more rapidly in the very recent period.

Long-term trends in sheep numbers for the whole county are shown in Figure 1. For the first half of the present century, the total sheep population fluctuated about the 200,000 level, and only since 1950 has carrying capacity increased. Breeding potential is more closely reflected in trends in breeding ewe numbers (for which statistics are not complete); there has been a steady increase in ewe numbers over the longer period as the proportion of ewes in the total flock has been rising, and then since 1950, the increase has moved closely with the total sheep numbers.

There are no long-term statistics for cattle available.

In recent years there have been 10-12,000 cattle recorded in the county and an upward trend is only apparent in the return for January 31st 1967, when 15,500 cattle are recorded. In the survey area, however, this rate of increase during 1966 is not maintained in 1967 (January 1968 data). According to the data provided by the farmers, present intentions indicate an annual rate of increase of 7.7 per cent for cattle from 1968 to 1971, whereas sheep are estimated to increase by 1.9 per cent per year.

THE ECONOMIC ENVIRONMENT

Recent trends in prices affecting sheep farms in New Zealand are shown in Table IV.

TABLE IV

Terms of Exchange - All N.Z. Sheep Farming

Season	Export Prices	Input Prices	Terms of Exchange
1955/58 Base	100.0	100.0	100.0
1956/57	107.7	100.0	107.7
1957/58	92.9	102.1	90.8
1958/59	86.5	104.3	82.9
1959/60	94.6	105.0	90.1
1960/61	90.7	106.5	85.2
1961/62	86.5	108.6	79.7
1962/63	93.2	109.3	85.2
1963/64	109.5	109.3	100.1
1964/65	103.4	112.2	92.1
1965/66	103.7	115.8	89.5
1966/67	98.1*	119.5	82.1
1967/68	89.9*	123.7	72.6

*Provisional

Sources: 1. Abstract of Statistics, Export Prices for Meat, Wool and By-products.
2. Annual Review of Sheep Industry, 1967/68.

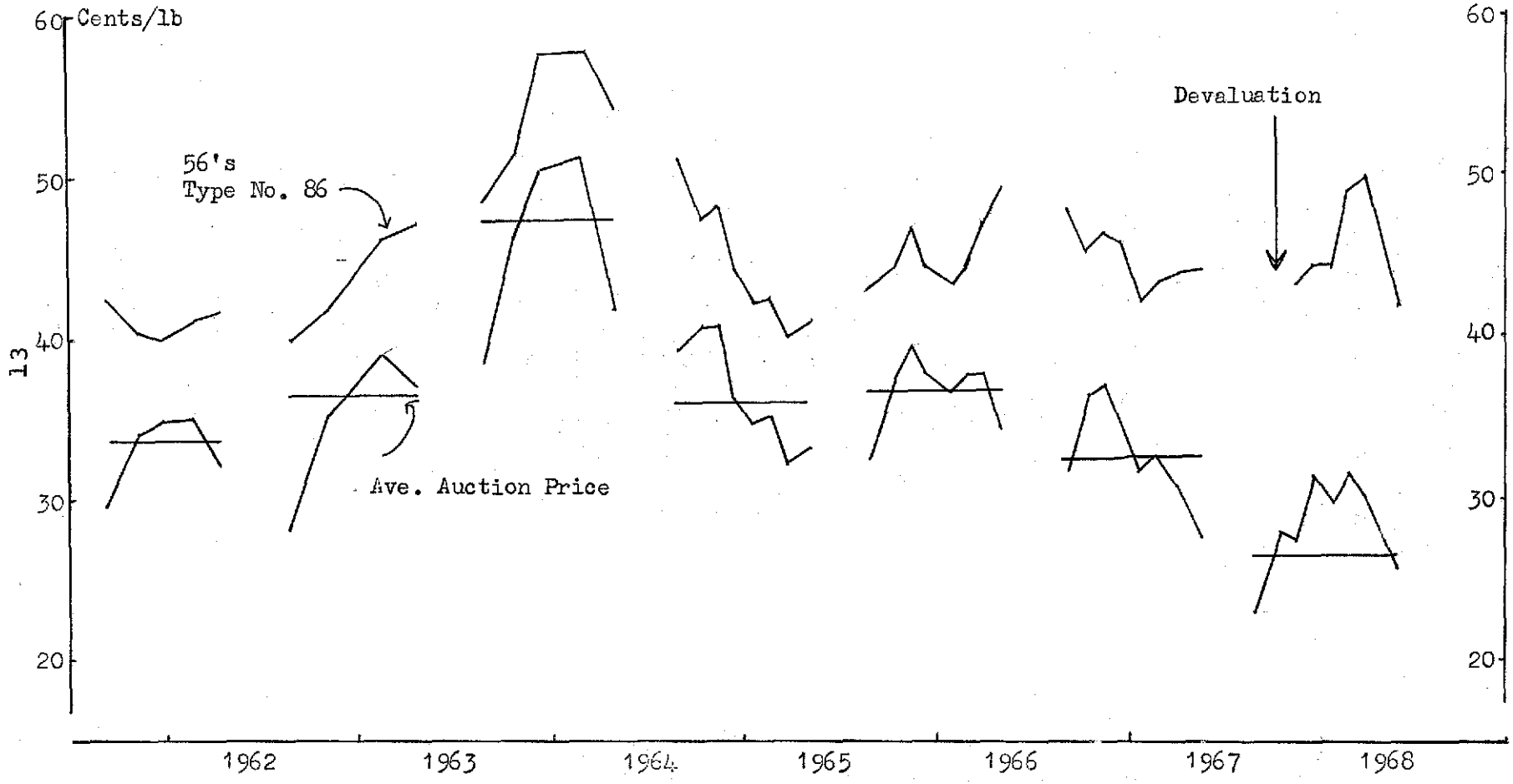
Since sheep farmers can sell wool, lamb or beef, there is no simple price series that represents the average situation. Instead, the index number of export prices shows how prices have changed in proportion to the quantities of lamb, wool and beef sold, and is based on the Government Statistician's Index of Export Prices for Meat, Wool and By-products. The index of input prices is based on the New Zealand Meat and Wool Boards' Economic Service cumulative index of cost movements on all sheep farms. The terms of exchange measure how prices of products sold and inputs compare.

In the face of steadily rising prices of inputs, product prices have fluctuated considerably in recent years. The early sixties showed considerable decline in produce prices and the terms of exchange; there was an excellent recovery from 1963 to 1965, and then the 1966/67 decline set in. Trends in individual product prices since 1966/67 are discussed below.

Figure 2 shows trends in greasy wool prices at the Christchurch sales from 1961/62 to 1967/68. The upper line shows auction prices for Type No. 86 - Good Average B Fleece, 56's, and the lower line average auction price for each sale. The build-up to the excellent prices of the 1963/64 season is now clearly shown, and then the steady decline which has taken place since. Christchurch sales tend to be dominated by fine cross-bred and Corriedale wools and hence these trends reflect quite closely the economic fortunes of Corriedale and Half-bred flock owners in North Canterbury.

The actual wool prices received by farmers in 1966/67 and 1967/68 were cushioned by the operation of the Wool Commission's floor price scheme. However the high proportion of buying-in by the Wool Commission caused it, initially, to drop its floor

FIGURE 2 GREASY WOOL - AVE. PRICE PER LB PER SALE - CHRISTCHURCH
(Includes supplementation in 1967/68)

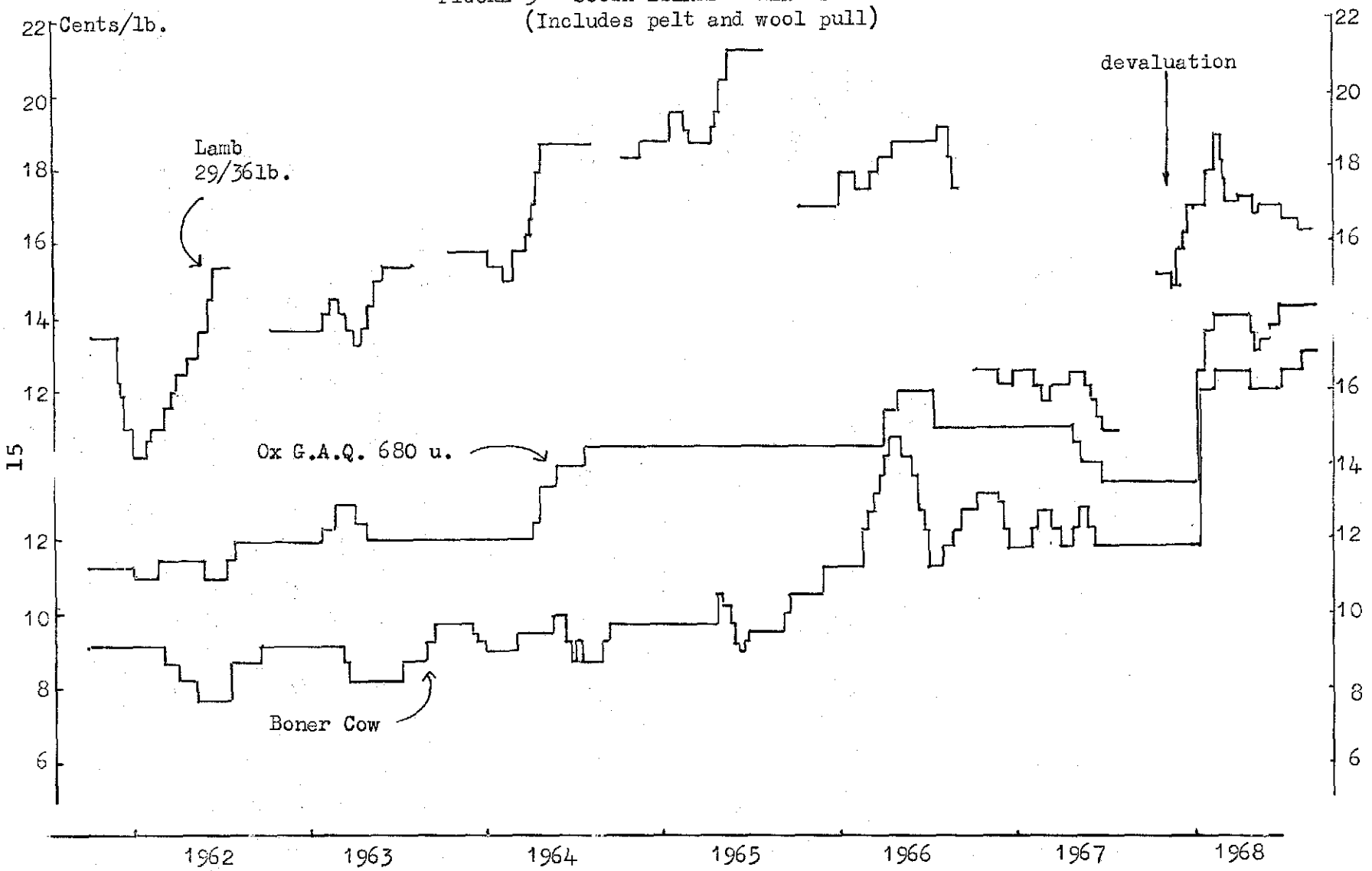


price from 30 cents per pound to 25 cents per pound on the 1st July 1967. On the 18th October, 1967, the Commission changed its basis of support to supplementing prices to wool growers up to the 25 cents level. There was no change in policy with devaluation on the 22nd November, but devaluation almost eliminated the need for the Commission's price supplementing activities. Fine wool prices did not suffer as severe a recession as coarse wool prices and at the date of survey were above support levels.

Figure 3 shows trends in the fat lamb price schedule, and the export beef price schedule from 1961/62 to 1967/68. Lamb prices reached a peak in 1964/65, fell to very low levels in 1966/67 but recovered somewhat in 1967/68 owing to devaluation and the foot and mouth regulations in the United Kingdom. The beef price schedule is represented by the quotations for Ox G.A.Q. 680 and under, and Boner Cow in Figure 3. In contrast to lamb, the general trend of the beef price schedule has been steadily upwards since 1962, and was markedly stimulated by devaluation in November 1967.

North Canterbury farmers are also dependent on local prices for surplus stock which are not measured in the Export Price Index quoted in Table IV. Table V shows recent prices offered for two-tooth ewes and 4/5 year ewes at North Canterbury ewe fairs. After a set-back in 1961/62 there was a steady rise in ewe prices up to 1965/66, when once again a decline occurred. Thus the demand for replacement stock in North Canterbury continued for two years after the best wool year and at least one year after the best lamb year. This phenomenon was probably associated with the general production drive which was set off by the Agricultural Development Conference. Since the 1966 ewe fairs, prices have fallen back to about 1963 levels.

FIGURE 3 SOUTH ISLAND - MEAT SCHEDULE PRICES
(Includes pelt and wool pull)



Price data does not provide a complete guide to farm profitability and confidence, but recent price trends have clearly intensified the traditional price squeeze under which farmers must operate. Since so much farm development in New Zealand depends on ploughed back profits, such price trends must lead to a complete re-assessment of development objectives. The rest of this report is concerned with how far the 1964 development targets have been achieved in the survey area, and with assessing physical trends in input use and production in the light of changing product prices.

TABLE V

Weighted Average Ewe Prices at North Canterbury Ewe Fairs

($ per head)

Season	Two tooths	4 & 5 yr. ewes
1959/60	5.05	2.40
1960/61	7.18	4.90
1961/62	5.38	3.35
1962/63	6.90	4.85
1963/64	7.30	4.78
1964/65	8.52	6.12
1965/66	9.88	6.98
1966/67	7.52	5.55
1967/68	7.00	5.09

Source: "Annual Review of the Sheep Industry 1967/68"
N.Z. Meat & Wool Boards' Economic Service
Publication No. 1436.

II. THE LIVESTOCK TARGETS

In preparation for the Agricultural Development Conference in 1964, Farm Advisory Officers of the Department of Agriculture were asked in September 1963 to make projections of livestock numbers for 1965, 1967 and 1972. Through the courtesy of Mr R.A. Milne, Farm Advisory Officer, Rangiora, the detailed estimates for Cheviot County were extracted from the totals for North Canterbury as a whole.

THE DEPARTMENTAL ESTIMATES

In making their assessment, departmental officers were required to analyse each county by broad soil type groups, finding the area in each soil type and then applying estimated stock carrying capacities to the area in each soil type. These carrying capacities were to be based on the carrying capacities of higher producing farms, the likely future achievements of these farms, and the likely achievements of other groups of farms.

Officers were told to assume that prices for farm produce would be reasonably remunerative and there would be no difficulty in selling the produce. They were also required to take into account recent technical advances, and the likely spread of these advances. At the time they made the assessments, they were aware of the 1963 budget concessions to farmers, but the 1963/64 wool-selling season had not commenced, and hence they were not influenced by the higher wool prices which followed.[1]

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[1] See Report of Agricultural Development Conference, Feb. 1966, Government Printer, pp.19-25.

THE 1968 SURVEY ESTIMATES

The objective of this investigation was to apply the carrying capacity estimates of the Department of Agriculture to the hill country areas of Cheviot County so as to compare the projections made for 1968 with the stock numbers actually achieved in 1968.

The Department of Agriculture at Rangiora recognised 27 soil types in the county as a whole, of which 22 were actually found on the farms surveyed. Some 57 farms were surveyed in both 1965/66 and 1967/68 so that the main results of the investigation are based on this sample of farms. A further four farms were surveyed for the first time in 1967/68, giving a total sample of 61 farms for the projections from 1968 to 1971, discussed later.

Each of the 57 farms was located on the soil map of the South Island, New Zealand, Sheet 6, and soil areas within each farm determined by planimeter. This technique therefore gave equivalent areas by soil types to those used for the Agricultural Development Conference projections.

The departmental officers' estimates provide present and expected carrying capacities of each soil land type for 1963 and the projection years. Table VI shows the carrying capacity coefficients assumed by the Rangiora office. These coefficients were applied to the areas within soil types found on the 57 hill country farms. This calculation gave a basic projection for this particular hill country area in North Canterbury which could be compared with subsequent performance and further projection work.

Table VII shows the areas of each soil type found in the 1968 survey, with the corresponding calculations of total carrying capacity. The Departmental assumptions imply an

TABLE VI

Departmental Estimates of Carrying Capacity by Soil Types for Cheviot County

Class	Soil Type	Area	Carrying Capacities (EE/acre)			
			1963	1966	1969	1972
1A	Templeton	2,950	2.5	2.6	2.8	3.0
	Waimakariri	3,020	2.0	2.1	2.3	2.5
	Wakanui	3,540	3.0	3.1	3.2	3.3
	Willowbridge	320	3.0	3.1	3.3	3.4
1B	Cheviot	13,250	2.5	2.6	2.7	3.0
	Domett	2,710	3.0	3.1	3.2	3.3
	Jordan	3,910	1.5	1.6	1.8	2.0
	Lottery	760	2.0	2.1	2.3	2.4
	Mairaki	5,170	2.5	2.6	2.8	3.0
	Medina	4,880	2.5	2.6	2.8	3.0
	Phoebe	4,610	2.5	2.6	2.9	2.8
	Tai Tapu	2,510	3.0	3.1	3.3	3.5
	Temuka	660	2.5	2.6	2.8	3.0
2A	Glasnevin	12,790	1.5	1.6	1.7	1.8
	Waimakariri Sh.	100	1.0	1.1	1.2	1.4
	Hapuku	80	1	1.6	1.0	1.0
4	Amberley H.	9,400	1	1.1	1.3	1.5
	Cheviot H.	11,320	2	2.1	2.2	2.3
	Gower H.	9,780	2	2.1	2.2	2.3
	Hui Hui H.	1,980	2	2.1	2.2	2.3
	Hundalee H.	3,460	1	1.1	1.2	1.3
	Hurunui	26,810	1	1.0	1.1	1.2
	Leader H.	10,100	1	1.0	1.1	1.2
	Onepunga H.	1,560	.5	.5	.6	.7
	Stonyhurst H.	6,270	2	2.1	2.2	2.3
	Waikari H.	1,100	2	2.1	2.3	2.4
5A	Haldon	54,740	.8	.9	.9	1.0
	Riverbed	11,500	.3	.3	.3	.3
	Total	209,280				

TABLE VII

1968 Survey Estimates of Carrying Capacity

Soil Type	Area (acres)	Total Ewe Equivalents 1963	1966	1969	1972
Haldon	30,558	24,446	27,502	27,502	30,558
Hurunui	29,364	29,364	29,364	32,300	35,237
Leader H.	15,474	15,474	15,474	17,021	18,569
Cheviot H.	9,668	19,336	20,303	21,270	22,236
Gower H.	9,389	18,778	19,717	20,656	21,595
Amberley H.	9,126	9,126	10,039	11,864	13,689
Glasnevin	8,057	12,086	12,891	13,697	14,503
Stonyhurst H.	5,341	10,682	11,216	11,750	12,284
Hundalee H.	4,052	4,052	4,457	4,862	5,268
Jordan	3,339	5,009	5,342	6,010	6,678
Mairaki	2,366	5,915	6,152	6,625	7,098
Medina	2,120	5,300	5,512	5,936	6,360
Onepunga H.	2,013	1,007	1,007	1,208	1,409
Waikari H.	1,838	3,677	3,860	4,227	4,411
Lottery	1,709	3,418	3,589	3,931	4,102
Wakanui	1,579	4,737	4,895	5,053	5,211
Hui Hui H.	1,092	2,183	2,293	2,402	2,512
Waimakariri	853	1,706	1,791	1,962	2,133
Willowbridge	477	1,431	1,479	1,574	1,622
Templeton	333	833	866	932	999
Tai Tapu	170	510	527	561	595
Domett	17	51	53	54	56

average carrying capacity of 1.29 Ewe Equivalents[1] per acre in 1963, 1.36 E.E. in 1966, 1.45 E.E. in 1969 and 1.56 E.E. in 1972 (June years assumed). The overall rates of increase are 1.7 per cent annually between 1963 and 1966, 2.3 per cent

[1] The basis of the ewe equivalent system employed was: ewes = 1, rams, wethers and hoggets = 0.8, breeding cow = 5.0, and other cattle = 4.0 units.

annually between 1966 and 1969, and 2.5 per cent annually between 1969 and 1972. It will be recalled that the national rate of increase arrived at by the Department was 2.3 per cent annually to 1972, and that the Conference actually raised the target rate to 3.5 per cent annually in 1964.[1]

Table VIII shows a comparison of the A.D.C. projections and actual results achieved and Figure 4 shows the two trends compared. It can be seen that the Departmental estimates were extremely conservative; the rate of expansion actually achieved on the survey area reached 7.6 per cent per year between 1965 and 1968.

In the course of the farm labour survey by J.L. Morris and R.G. Cant in 1965/66, farmers in the sample area were asked to estimate what their carrying capacity would be in five years' time. The linear trend to the overall figure in 1970 is also shown in Figure 4, and this rate of increase corresponds to an annual growth rate of 5.4 per cent in total ewe equivalents.

All in all, the actual expansion in stock numbers has been very much higher than either of the early projections anticipated. As with other areas in New Zealand, the targets set were achieved more quickly than was thought possible in 1963, and even farmer expectations were exceeded in Cheviot County.

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[1] Conference Report, 1966, p.17.

FIGURE 4 PROJECTIONS OF LIVESTOCK NUMBERS - 57 FARMS

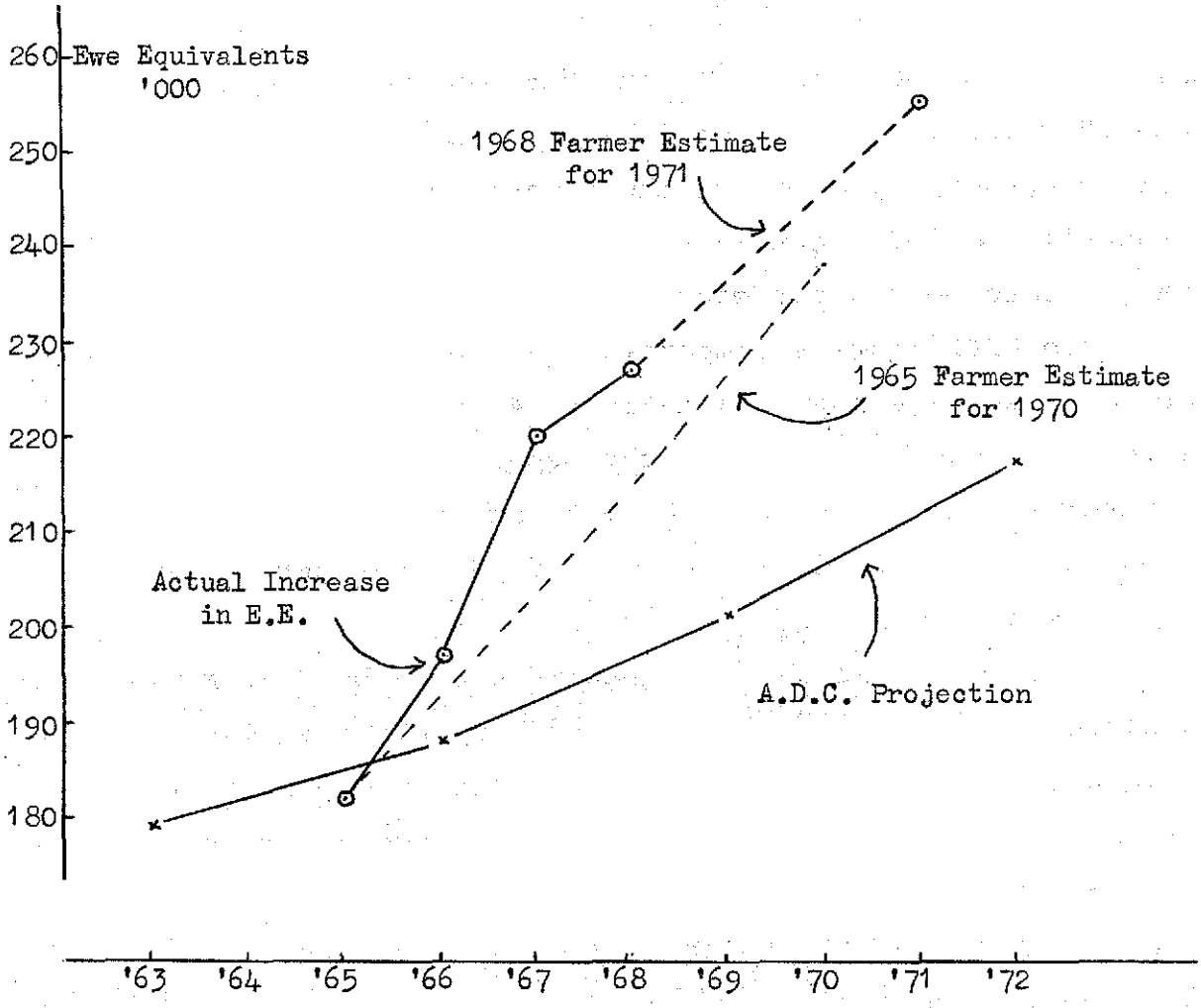


TABLE VIII

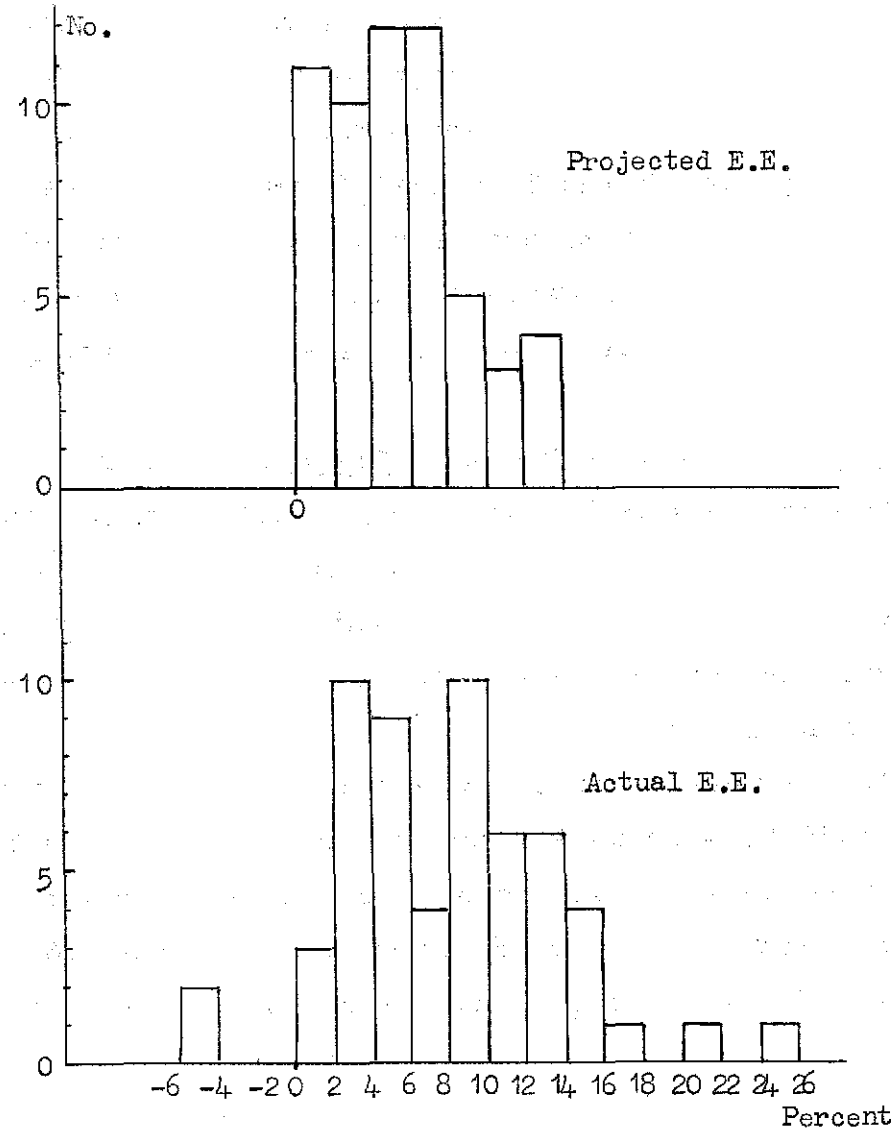
A.D.C. Projections and Actual (57 farms)

Years	A.D.C.	Actuals
June yrs.	(E.E.)	(E.E.)
1965	185,263*	182,138
1966	188,329	197,158
1967	192,661*	220,547
1968	197,092*	227,209
1969	201,397	-

*Interpolated

Note: The 57 farms were slightly below average carrying capacity for the relevant soil types in 1965.

FIGURE 5 FREQUENCY DISTRIBUTION OF INDIVIDUAL RATES OF INCREASE 1965-68



INDIVIDUAL FARM PROJECTIONS OF TOTAL EWE EQUIVALENTS 1965-1968

Over the whole sample of 57 farms, the Departmental estimate of the rate of increase of stock numbers was 2.3 per cent per year. Farmers estimated their rates of increase at an average of 5.4 per cent per year in 1965/66, and it has just been seen that a rate of 7.6 per cent per year was actually achieved between 1965 and 1968. More details of these projections can be shown in the rates of stock increase for individual farms.

Figure 5 shows graphs of expected rates of increase given

by individual farmers in the summer of 1965/66 as compared with the rates of increase of stock numbers actually achieved on the 57 farms. In their projected estimates, farmers ranged from zero to 14 per cent annual rates of growth, with the great majority being less than 8 per cent. As might be expected, actual achievement is distributed more widely, ranging from two farms which actually carried less stock to two farms which increased by more than 20 per cent per year.[1]

SAMPLE PROJECTIONS OF SHEEP AND CATTLE 1965-1968

Separate trends in sheep and cattle numbers for the sample area are shown in Figure 6 and Table IX. There are no equivalent estimates of sheep and cattle from the Departmental calculation as these were only available in ewe equivalents measure.

Actual sheep number increases were greater in the period 1965 to 1968 than farmers expected in mid-summer 1965/66. The average rate of increase was 6.9 per cent per annum, and this includes a marked falling off in growth between 1967 and 1968, compared with an expected growth rate of 5.4 per cent.

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[1] The individual rates of increase for farms given in 1965 can be compared with actual rates achieved by cross-classification. Given that the mean annual increase projected in 1965 was 5.5 per cent per year and the mean achievement was 7.6 per cent per year, 33 farmers achieved what they set out to do within reasonable limits, 18 farmers markedly exceeded their expectations in 1965, and only 6 farmers seriously over-estimated their potential. Since some of the latter results could have been caused by wholly irrelevant factors, there is not a great deal of evidence for serious over-estimation of results by the farmers in the sample.

FIGURE 6 PROJECTIONS OF SHEEP AND CATTLE NUMBERS - 57 FARMS

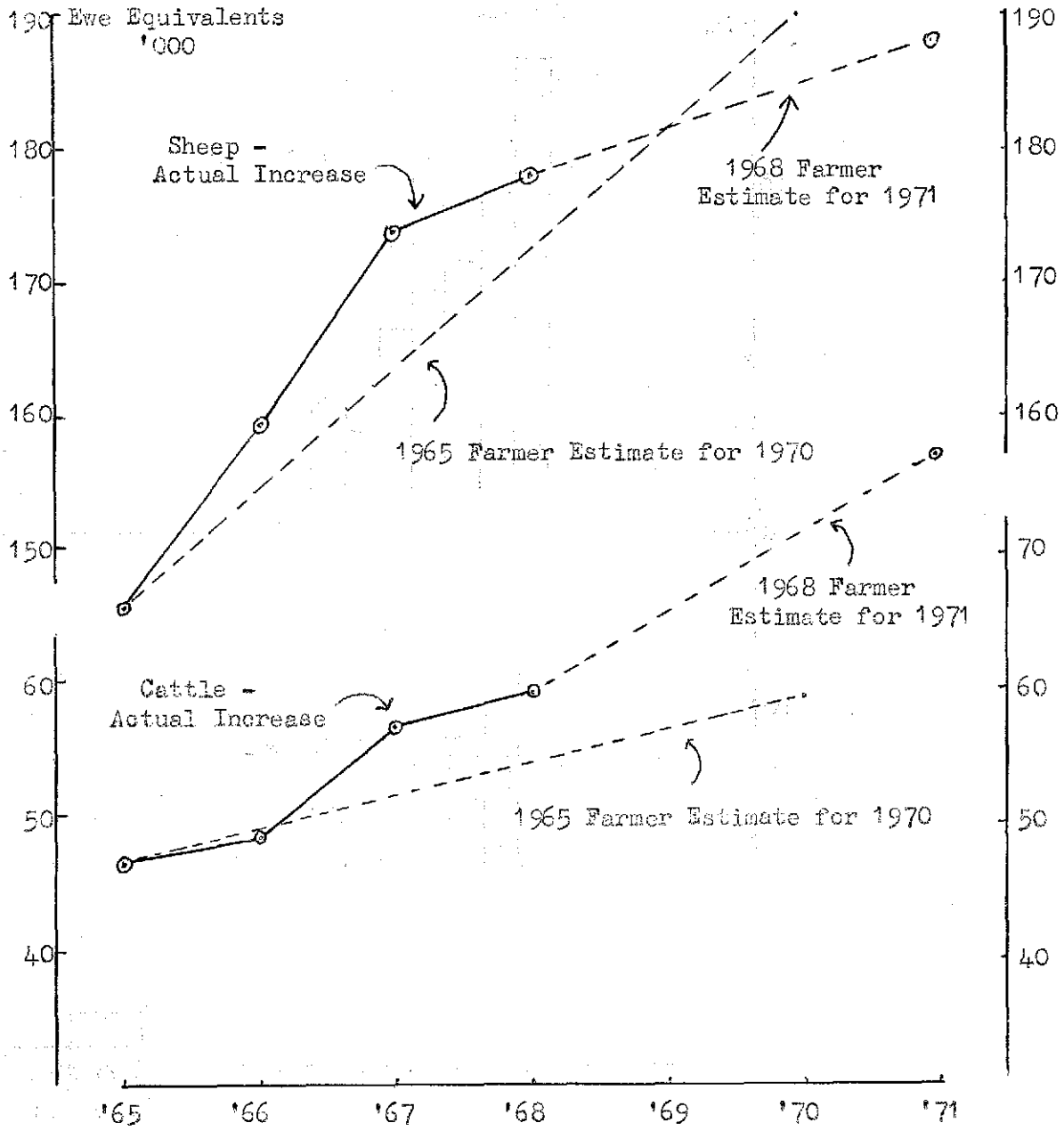
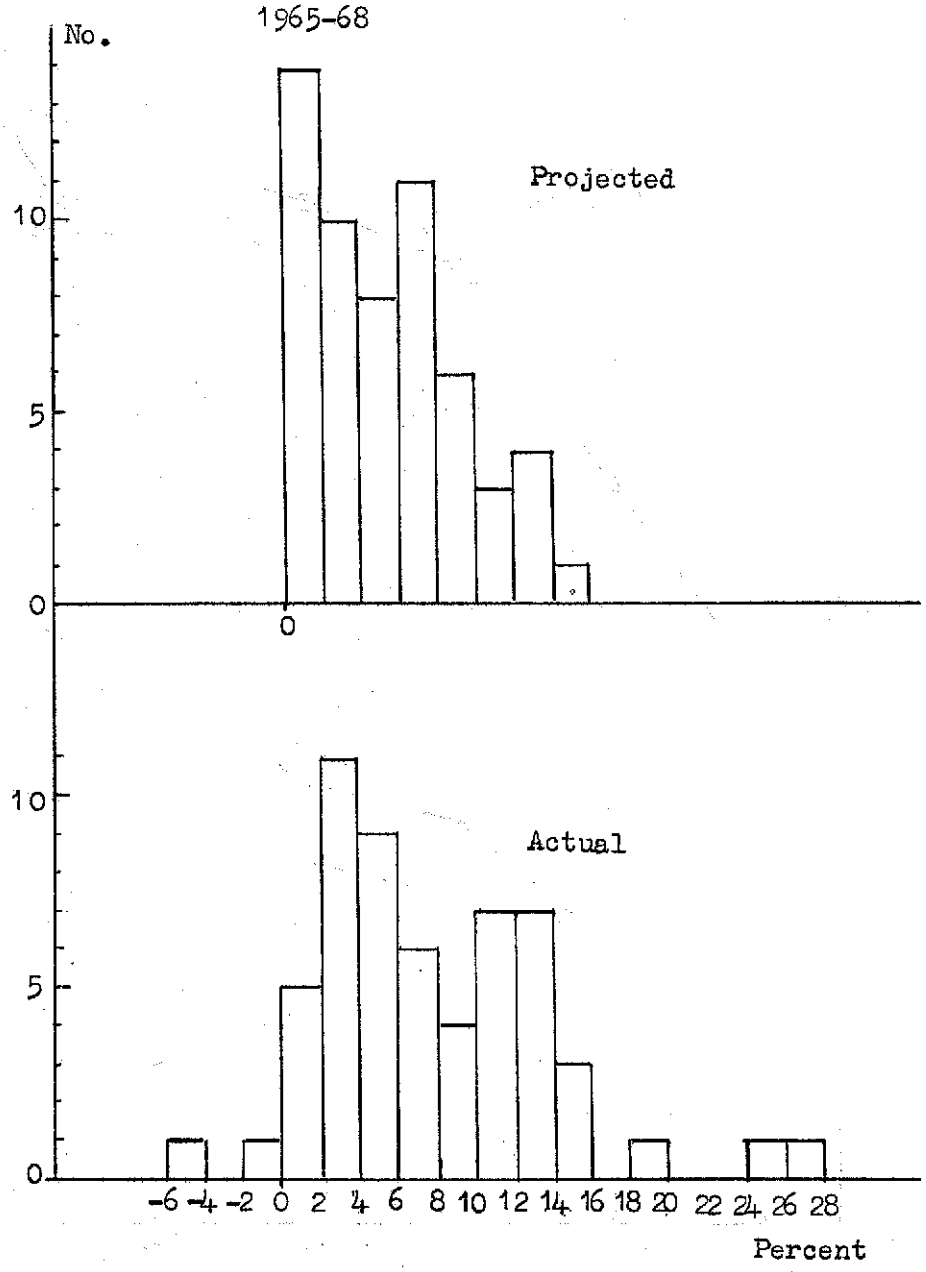


TABLE IX

Sheep and Cattle-Farmer Projections and Actuals (57 farms)

Years	Sheep E.E.		Beef Cattle E.E.	
	Estimated	Actual	Estimated	Actual
1965	-	145,860	-	36,278
1966	153,736	158,570	38,418	38,588
1967	162,038	174,050	40,685	46,497
1968	170,788	178,095	43,085	49,114

FIGURE 7 INDIVIDUAL RATES OF INCREASE - SHEEP 1965-68



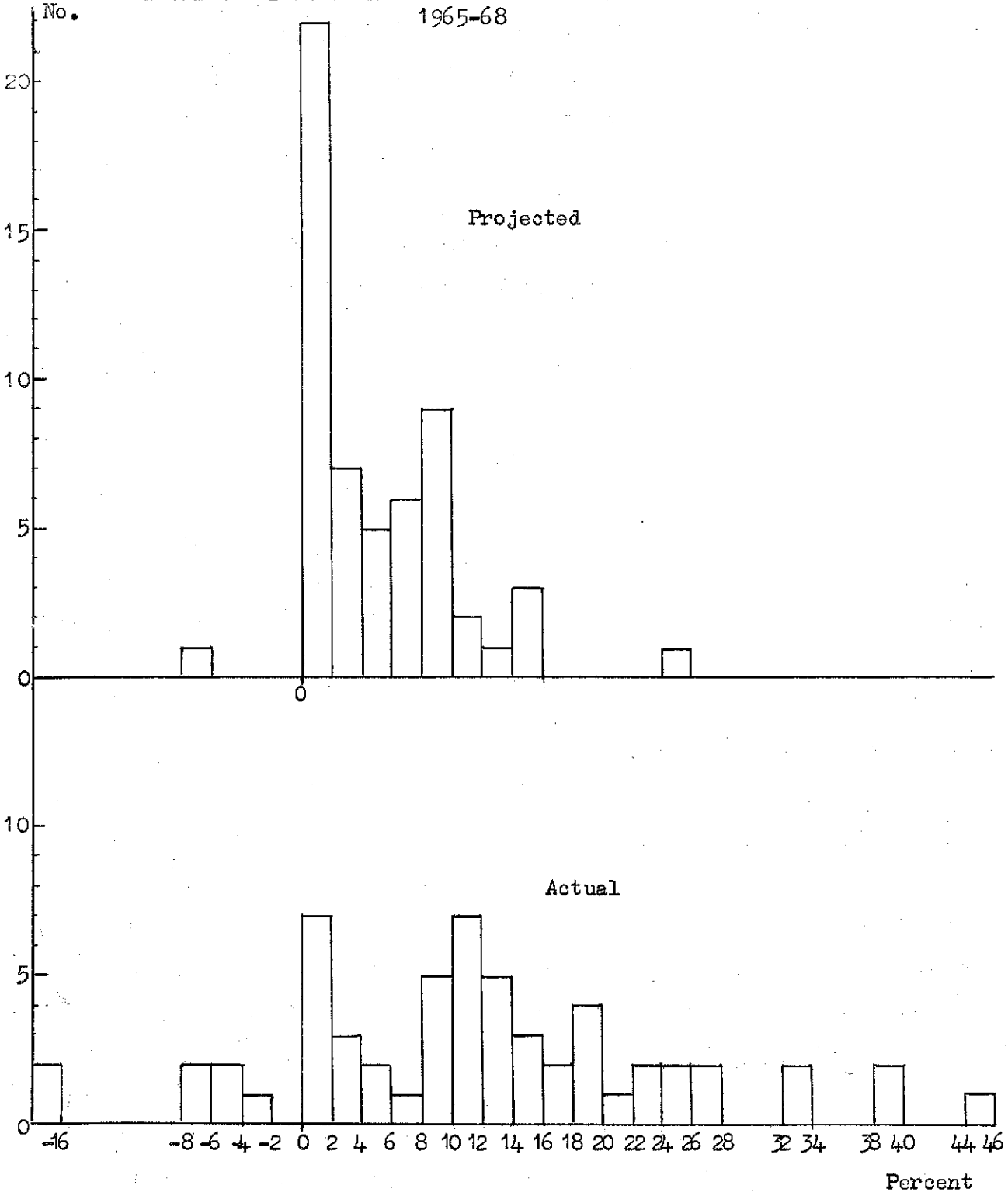
Breeding ewes have increased in step with the total number of sheep. Cattle numbers have actually increased by 10.8 per cent per year on the 57 farms from 1965 to 1968 compared with 1965 estimated growth rate of 5.9 per cent. The important point in this connection concerns farmers' intentions in the future. This is discussed below.

Individual farm rates of increase for sheep and cattle for the period 1965 to 1968 are shown in Figures 7 and 8. Projected sheep rates of increase range from zero to 16 per cent per year, and actual rates vary from declines in numbers up to 28 per cent annual increases. The distribution of cattle growth rates is much wider; the estimated growth rates included one farm which was going to move out of cattle, and some increases of up to 25 per cent per year. In fact, seven farmers reduced cattle, but some farmers increased their carrying capacity by over 30 per cent with one farm at 46 per cent.

PROJECTIONS FROM 1968 TO 1971

Projected growth rates for the period 1968 to 1971 were also collected from individual farms, in this case 61 farms being visited. (Only 57 farms were surveyed in 1965 to give full data for the 1965/68 period.) The average expected growth rate in total ewe equivalents from 1968 to 1971 is 3.8 per cent per annum. This consists of a growth rate of 1.9 per cent per year for sheep, and 7.7 per cent per year for beef cattle. As Figure 6 shows, sheep numbers in the 1970's will probably fall below the 1965 projections, while cattle will be far above 1965 estimates for the 1970's. Individual farm growth rates for 1968-71 are shown in Figure 9. A large number of farmers were most cautious in their assessment of the future

FIGURE 8 INDIVIDUAL RATES OF INCREASE - CATTLE 1965-68

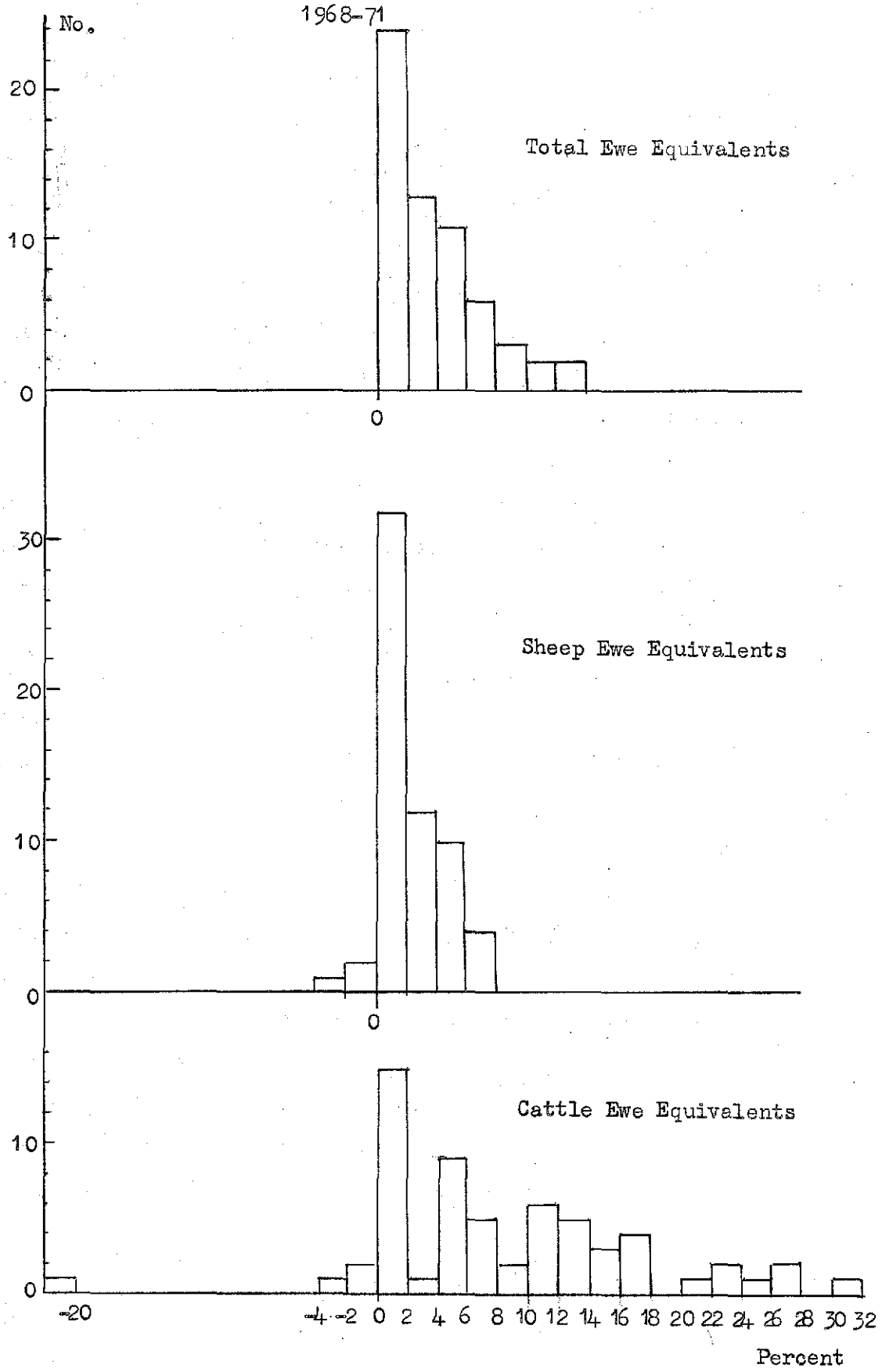


as the shape and distribution of total stock rates of increase show. Twenty four farms, or 40 per cent of the sample, estimated stock increases, of less than 2 per cent per year. In terms of sheep numbers over half the sample intend to keep stock increases down to less than 2 per cent per year, while cattle rates of increase range widely from small decreases right up to 20 per cent or more per year (highest 30 per cent).

Two outstanding facts stand out from this discussion of target stock increases. On the basis of the Department of Agriculture's projected carrying capacities, the survey area should have 217,000 total ewe equivalents in 1972. Already in 1968 this has been exceeded by 10,000 E.E. By 1972, total ewe equivalents are likely to reach 255,000, some 18 per cent higher than forecast in 1963. Owing to the efforts of the Agricultural Development Conference, and the favourable period of returns which followed, the Departmental estimates of the possible rate of growth of the industry have been well exceeded, and have in fact been raised above the revised levels recommended by the Conference.

Secondly, recent years have seen a marked shift in preference from sheep to cattle. The period when cattle were only necessary implements needed to clear up pastures is clearly over, and a new pattern of grassland farming is developing where the two animals have equal demands on the available resources on farms. In some areas, topography and other natural conditions may favour one or the other, but only a very marked change in product prices seems likely to alter this new indication of the future pattern of production for New Zealand agriculture.

FIGURE 9 INDIVIDUAL RATES OF INCREASE - ALL STOCK 1968-71



III. CHANGING PRICES AND DEVELOPMENT

In this final section, some further points from the 1968 questionnaires are discussed, and the general conclusions of the survey are briefly set out.

THE LABOUR PROBLEM

In the previous survey of Cheviot County in 1965/66 special attention was paid to labour problems associated with expanding production. In 1967/68 the sample of farmers visited was again asked whether further labour was needed in the area. Previously, 18 farmers had reported a shortage of labour; this time only one farmer stated labour was an inhibiting factor in development. In general, farmers are now prepared to carry on with the labour complement they have at present, and economy in labour use must be sought along with other savings. With the continued expansion of stock numbers, and a stable labour force, labour productivity has increased remarkably as the figures in Table X show.

TABLE X

Trends in Livestock Numbers, Employment and Labour Productivity
Cheviot County, 1965-68
(57 farms)

Year	Ewe Equivalents	Labour Units	Ratio
June 1965	182,138	119.56	1,524
June 1968	227,209	116.74	1,946

The total ewe equivalents includes both cattle and sheep as shown in Table VIII. Labour units are based on full-time labour employed, whether owner, family labour, married men or single men, with student labour, casual labour and group farm labour converted to a full-time basis (i.e. working week of

5½ days for 48 weeks per year).

Part of this increase in technical labour productivity is due to the existing labour force, especially owners, doing more work than before, but part of the increase is explained by carrying more cattle and sometimes dry sheep, which reduces the labour directly required in day-to-day work.

There is no strong trend in cattle policies as such, for the nature of most of this country dictates that a breeding herd is maintained. But farmers on more favourable country, with access to low hills or flats, have been tending to hold weaners back for fattening rather than quitting at 9 months or thereabouts. This allows the extra carrying capacity to be taken up with cattle more quickly than otherwise.

PATTERNS OF DEVELOPMENT

Farmers were asked if the pattern of development on their properties had changed. The commonest method of development in recent years has been aerial topdressing and oversowing of the native tussock. Areas which have been cultivated, cropped and sown down to pasture have been much smaller, although it is generally conceded that cultivation is a quicker and surer method of raising carrying capacity.

Table XI shows a summary of the answers given by farmers. Some details of development plans were collected in the 1965/66 survey and this was brought up to date in 1967/68. In addition, farmers were asked to indicate their intentions for the next three years if present prices (mid Jan. 1968) continued. The superphosphate totals shown in the table refer to maintenance and new areas topdressed, and hence do not exactly agree with the figures for the new area oversown and topdressed each year.

In 1967/68 there has been a 25 per cent reduction in fertiliser use on the sample farms. Farmers' intentions are to increase their applications again to about 1965/66 levels in the next three years.

TABLE XI

Patterns of Development, Cheviot County, 1965-71
(61 farms)

	Actual Achievement			Projected Plans		
	1965/66	1966/67	1967/68	1968/69	1969/70	1970/71
Superphosphate (tons)	2,400	2,492	1,857	2,290	2,217	2,370
Area developed by O/S and T/D (acs)	5,530	5,784	650	1,140	1,540	500
Area developed by Cultivation (acs)	1,841	2,123	1,846	1,767	1,492	1,320
New subdivision fencing(chains)	3,693	3,201	2,803	2,680	2,050	1,730

Most of the drop in fertiliser used was for new areas oversown and topdressed, which declined to a tenth of its former level in 1967/68. A small increase in oversowing is expected in the coming seasons. The area being brought into improved pasture by cultivation was maintained in 1967/68, although some tapering off is envisaged in the coming seasons. Also the level of new sub-division fencing is being fairly well maintained, with again some slackening off in the coming season.

Farmers were also asked if present water supplies were adequate without further development. It will be remembered that a comprehensive piped water scheme was commenced in the area in late 1967 and at the time of the survey, few farms had yet been connected. Thirty-six of the survey farms will draw

water from the scheme. Of the 61 farmers, 35 thought existing supplies were adequate, and 26 thought they were not. Farmers were then asked if existing water supplies would be adequate for future increases in stock. Only 19 thought they would be, and 42 said they needed extra water. Most of these will, of course, be serviced by the new scheme, but farmers outside the scheme area will have to make extra private investment in new water supplies.

ATTITUDES TO DEVELOPMENT

Finally, farmers were asked about their attitudes to increased production. Considering current prices for products (i.e. Jan. 1968) they were asked if they considered increases in production worthwhile. The intention of this question was to evaluate personal attitudes to development, and on the spot the emphasis was laid on the farmer's own situation.

Fifty out of the 61 farmers questioned thought increased production was worthwhile. Of these 42 believed there were serious limiting factors at present. The majority (23) specified lack of capital and/or seasonal finance as the main reason, five specified the uncertainty of the future, three said they had estate problems, two specified water supply problems and other reasons mentioned were the shortage of farm labour, absentee ownership, footrot, health of wife, and age of partner; in addition one reply mentioned both seasonal finance and water supply as limited, and another lack of capital and inadequate water supply.

Of the eleven who replied that increases were not worthwhile, five said it was now unprofitable, two said they were satisfied with present returns, one specified lack of

finance, one specified his property was already fully developed, while of the two others, one stated he was satisfied with present production and taxes made development unprofitable and the other stated that further increases in production incurred tax on his income at a high rate.

In general, the majority were in no doubt that extra production was a paying proposition, but they now had serious doubts that they could finance capital work out of their own resources. The minor reasons holding up production would be found in a cross-section of any farming community - the significant point is that the majority of farmers believed that development was worthwhile at present prices.

When asked how farmers could be helped to improve their farms a great number of answers were given. These are listed as closely as possible below.

The answers in order of frequency were:-

1. Reduction of personal tax (15)
2. Reduce price or subsidise fertiliser (13)
3. Provide cheaper finance (8)
4. Ensure more stable prices (7)
5. Reduce land valuations and/or land tax (3)
6. Delay mortgage repayments (2)
   Subsidise initial development (2)
   Counter cost squeeze (2)
7. Secure better markets (1)
   Lower import duties on contractors' machinery (1)
   Provide seasonal finance (1)
   Lower death duties (1)
   Sub-divide and force development (1)

In general these answers reflect the farming community's view of their place in society and also the particular problems they face. With the maximum rate of income tax reached at $7,200, personal incomes in farming can reach this level quite quickly with relatively small improvements in product prices. The profitability of extra development is judged in terms of good price years that have occurred in the past. In addition, tax payments usually restrict the amounts which can be ploughed back into the business, even though a great deal of development expenditure is tax exempt. Clearly no one likes paying taxes.

As Table IV shows, the inflation of farm costs through price increases is a serious problem in New Zealand. Fertiliser comes first in development economics in New Zealand, but cheaper finance, less land tax, and subsidised development are all mentioned above in this connection. Surprising little stress is placed on market fluctuations in view of recent difficulties. Is there some deep-rooted objection among New Zealand farmers to reducing price fluctuations by controlled marketing schemes? Do they <u>really</u> believe that what they lose on the swings they will gain on the roundabouts?

IV. SUMMARY & CONCLUSIONS

1. In a detailed analysis by soil types, the Department of Agriculture estimated in 1963 that the number of livestock in New Zealand were likely to increase at an annual rate of 2.3 per cent in the period from 1965 to 1972.

2. After consideration of New Zealand's export prospects, import needs, and other matters, the Agricultural Development Conference met in 1964 and laid down a target rate of increase of 3.5 per cent per year for the country's livestock industries. As far as sheep numbers were concerned, the Conference indicated that the development of hill country was most essential in meeting the targets.

3. These targets and the reasons for setting them were well publicised throughout New Zealand in 1965 and 1966 with considerable emphasis on the national desirability of reaching the targets. Finance was made available, tax remissions made on development work and local committees organised. From 1963 through to mid 1966, farm product prices were exceptionally favourable, which in turn meant that incomes in the farming sector were also above average levels. This favourable revenue position in turn enabled many farmers to invest in farm improvements which would ultimately raise carrying capacity levels in line with national objectives.

4. Since 1966, however, farm product prices have declined considerably, prices of inputs have continued to rise,

and farm incomes have been severely squeezed. Could expansion continue under such conditions?

5. This report is concerned with examining the impact of changing prices in a typical hill sheep farming area in North Canterbuty. Cheviot County was chosen for the analysis, and the techniques of the Department of Agriculture were followed through to trace how the livestock targets for this area were formulated, and whether they could be achieved.

6. It was found that the original calculations suggested that a 2.3 per cent per year increase in livestock numbers could be expected. When the sample of farmers in the area were questioned in the summer of 1965/66, they estimated that they would achieve a 5.5 per cent increase each year to 1970.

7. By the summer of 1967/68, these farms had in fact achieved a livestock rate of increase of 7.6 per cent per year. Sheep have increased by 6.9 per cent per year and cattle by 10.8 per cent per year.

8. The farmers were then asked in 1968 how they proposed to increase their stock numbers in the period up to 1971 in the light of falling product prices. Over all stock, the average rate of increase to be expected is 3.8 per cent per year; sheep at 1.9 per cent per year and cattle at 7.7 per cent per year.

9. On the farm development question, the farmers visited were actively reviewing their present development policies, and already the application of superphosphate has been cut back, over-sowing and topdressing of new areas virtually suspended and development by cultivation partly reduced. On the other hand, a reasonable level of stock expansion is still envisaged and some recovery in development work, especially fencing, is projected.

10. On the question of profitability of development, the farmers in the areas were not completely shocked into inertia, for the majority agreed that increased production was worthwhile especially if capital and seasonal finance could be obtained on reasonable terms. In their opinion, the incidence of income tax was a strong disincentive to further development, and the farming industry could be considerably helped by subsidies or price control on inputs.

11. The effect of falling product prices has been felt in the development priorities of farms. There is an aversion to over-sowing and aerial topdressing (for which the results are somewhat uncertain and subject to seasonal vagaries) but quite strong emphasis on development by cultivation on accessible areas. In terms of investment priorities, the order of priorities at present appears to be: cattle, then superphosphate for existing developed areas, then subdivision fencing for greater pasture control, and then weed control. (In the northern part of the county, where the rainfall is higher, manuka, gorse and broom are serious problems).

12. In general, further stock increases are envisaged over the next few years, with the same labour complement as previously, and with new investment in key development priorities rather than in management aids such as new yards, woolsheds, hay sheds and the like.

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