ECONOMIC ASPECTS OF FARMING LIGHT LANDS IN CANTERBURY'

By R. H. SCOTT, Land Utilisation- Officer, Department of Agriculture, Wellington, and

R. C. STUART, Agricultural Economist, Department of Agriculture, Christchurch.

This afternoon you will be visiting Ashley Dene, the College light land farm, approximately 70 per cent of the area of which is typical of the light lands of the Canterbury Plains. The term "light" when applied to soils may have many meanings, but Canterbury farmers know only too well what they mean by the term; they think immediately of that considerable area of approximately 850,000 acres on the plains where shingle is to be found within 18 inches of the soil surface and in some cases right to the surface.

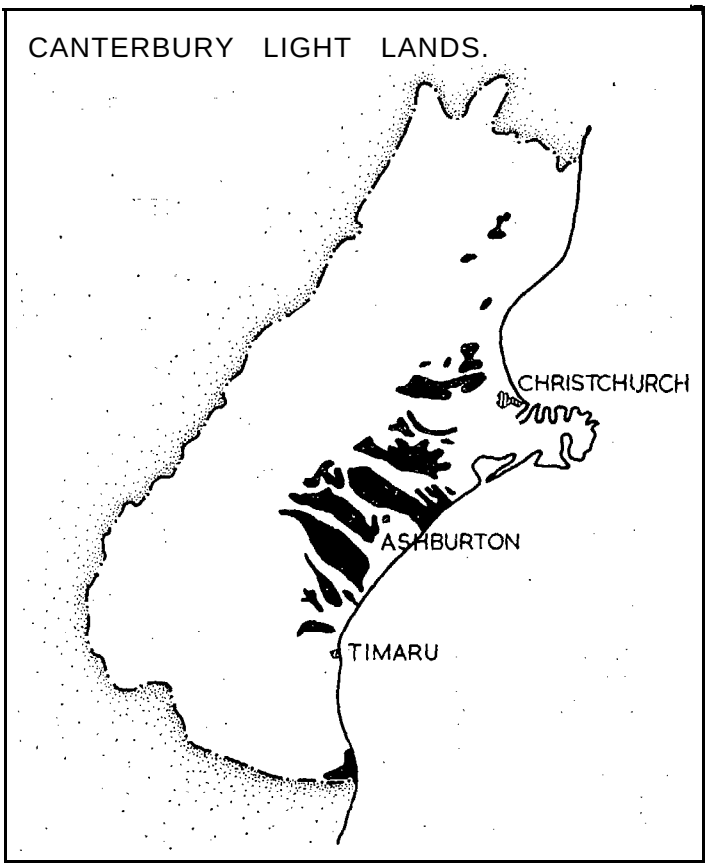
Until recent times it was an area-looked upon with disfavour and financial institutions placed it at the bottom of their lists of land representing sound security for loan moneys. Some farmers occupying better class land held areas of these light soils for winter run-off country and this is still a practice in some parts.

With a soil of this nature under an annual rainfall of about 25in., and with hot, desiccating north-west winds in summer, drought conditions frequently prevailed and the pasture cover of poor-producing grasses such as danthonia *(Danthonia pilosa* and *Danthonia semiannularis)* and browntop *(Agrostis tenuis)* interspersed sometimes with shrubby plants like gorse *(Ulex europaeus)*, broom *(Carmichaelia* spp), and wild irishman (*Discaria toumatou*) , became burned and brown and carrying capacities were then measured on the basis of an acre or so per sheep and not sheep per acre.

This brief description is given in an endeavour to convey a mental picture of the appearance, particularly in summer, of this large area of light land before what we might call the light land farming revolution which is still in progress and which may continue for a number of years until the transformation is complete with

the extension of state irrigation schemes to a considerable part of these soils.

To give some idea of the economics of farming this land, it is necessary to resort to figures showing the financial structure of farms and the returns being obtained by farmers. These figures are based on information collected in August and September of this year from a number of farmers on these soils extending from the Ashburton district to parts of North Canterbury. We know the sample is not a statistician's dream, but in the farming environment the farmer himself is the most variable factor. Some farmers keep adequate records and have good memories ; others keep records of a kind and sometimes have indifferent memories, with the result that information on the management and financial aspects 'comes from those who have it and are able to supply it. However, we are satis-



fied that our information is representative of the present farming picture for these parts of Canterbury.

Unimproved Light Land Farms

Today there are few completely unimproved farms on the light lands, that is, farms where the pasture cover comprises mainly low-producing species like browntop, danthonia, etc., and as a result the physical and financial data relating to this class of farm are not truly representative of farms where the pasture cover is completely unimproved.

The size of these farms ranges from about 600 to 1400 acres, and they run the equivalent of 0.9 ewes per acre (that is, all stock converted to the common denominator, the ewe). The physical production is low, the output of wool per acre being about 8.5lb ; they fatten about .6 lambs per acre, equivalent to approximately 17.5 lb lamb meat. A small portion of the flock replacements are bred on the farms, the greater part being bought in, these being old ewes.

The capitalisation of the farms is not great, and on a per acre basis is approximately as follows:

Table l-Capital Structure per Acre on Unimproved Light Land. Farms

	£ N.Z.	$ U.S.
Unimproved value of land . .	4.60	12.88
Improvements on land . . .	3.42	9.57
Livestock	2.91	8.17
Plant ,	1.13	3.16
	12.06	33.78

To arrive at this capital structure we used for the land and improvements the Government valuation made under the Valuation of Land Act, for stock a conservative market value, and the plant was valued at a figure it might realise if sold.

The revenue from the properties comes from sheep products, wool, fat lambs, and store sheep accounting for between 95 and 100 per cent of the revenue.

A further index which we have adopted to enable comparisons to be made between groups of farms is that which we call "owner surplus per acre." To arrive at this index, from the total farm revenue, we deducted farm running expenses, overheads such as depreciation on assets, and interest on the value of land, livestock, and plant. The balance or "owner surplus" is the amount available to the farm owner to meet his living

expenses, taxation, and any investments such as principal repayments on a mortgage and improvements to the farm enterprise.

On- these unimproved, farms the owner surplus worked out at £1 6s. per acre, or about U.S. $3.65.

Improved Light Land Farms

By the end of the economic depression of the 1930's a few Canterbury farmers had proved the worth of subterranean clover, but the majority of light land farmers up to that time had not been in a financial position to exploit its use or to purchase the necessary fertiliser. This College, at its Ashley Dene farm, started to use subterranean clover in 1937 and a neighbouring farmer, the late' Peter Chamberlain, was also a subterranean clover convert. The work of the College and some of the other pioneers showed the way to a brighter future for those occupying these light lands.

Subsequently the value of lucerne was realised and we find the late C. C. Leitch speaking of another innovation at the first post-war conference of this Association in 1948 at Christchurch. He then said "More recently, successful attempts have been made to establish cocksfoot and lucerne to bridge the gap when the subterranean clover goes off." He went on to say, "It

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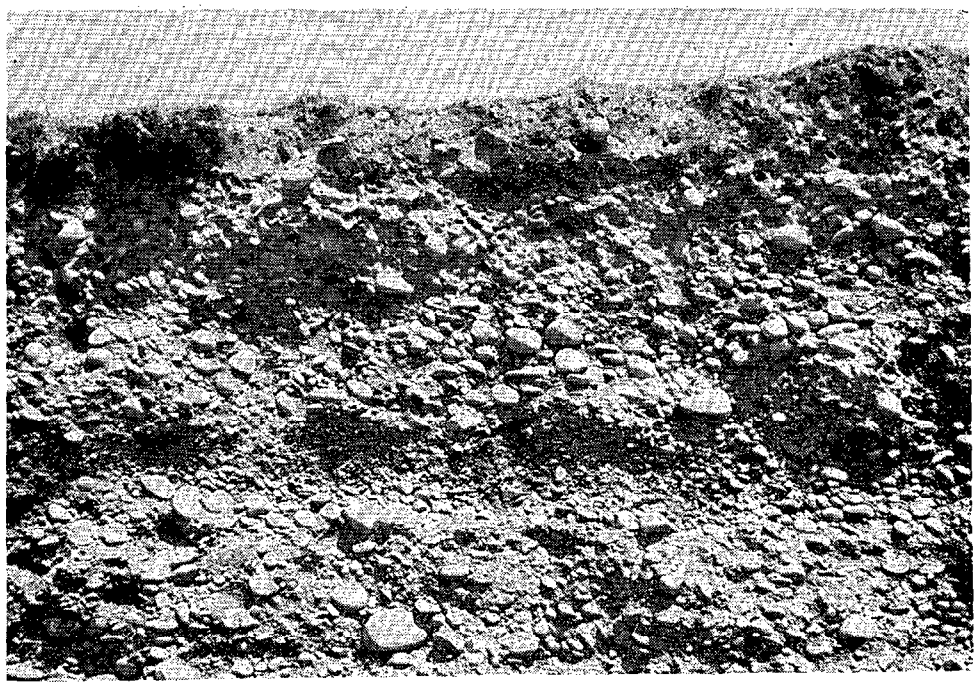


is felt this mixture could be used more widely on some of the light plains country with definite advantage."

In short, the use of subterranean clover, the establishment of lucerne stands for silage, hay, and grazing, the increased use of lime and superphosphate, and the special-purpose pasture of lucerne and cocksfoot have brought about a transformation to the Canterbury light land farming scene over the past decade.

On the better managed and more highly improved light land farms using these techniques the carrying capacity is now equivalent to approximately 2.3 ewes per acre; wool production is about 211b per acre, and about 1.5 lambs per acre are fattened, giving 45.7lb of lamb meat. Flock replacements are bred on the farms.

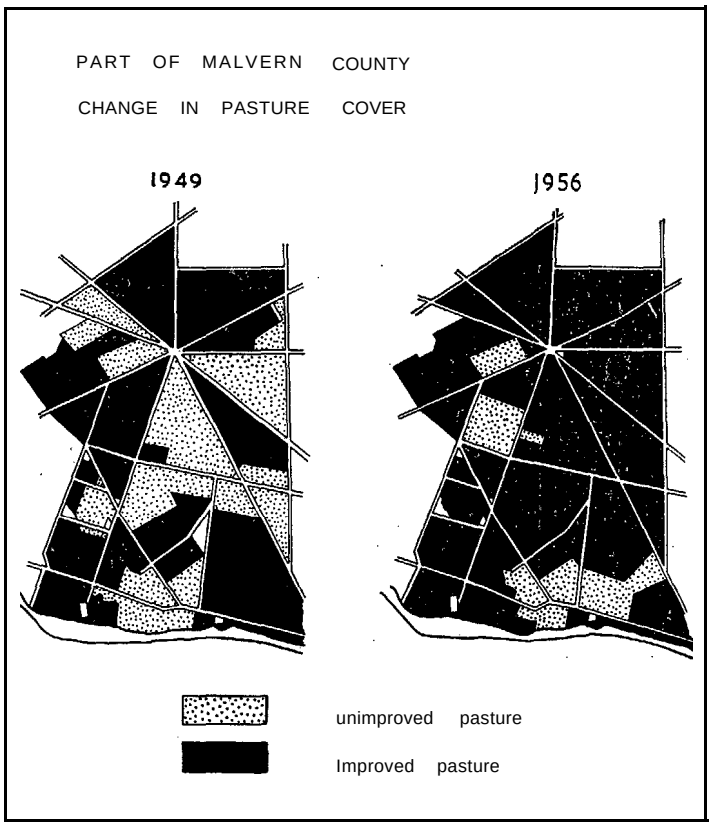
Farm capitalisation per acre is naturally higher than for the unimproved farms; improvements which increase the productive capacity of a property are quickly written into land values, more stock are carried, and more equipment is used.

Table Z-Capital Structure per Acre of Improved Dryland Farms

	£ N.Z.	$ U.S.
Unimproved value of land	8.8	24.64
Improvements on land	10.3	28.84
Livestock	7.2	20.16
Plant and equipment	3.5	9.80
	29.8	83.44

The owner surplus per acre is just over $4.

The transition from unimproved dryland farms to improved units has been gaining momentum during recent years. Seven years ago officers of the Economics Section of the Department of Agriculture at Christchurch made a survey covering 30,000 acres on the light land in the Malvern County, a district some 10 to 15 miles west of the College. Information was collected from the same area in August and September of this year. The average carrying capacity of the farms had increased from 1.2 to 1.7 ewe equivalents per acre, wool production from 10.3 to 15.6 lb per acre, and the number of lambs fattened per acre from 0.8 to 1.4. The land use pattern had also changed since 1949. Cereal and pulse crops occupied 9.5 per cent of the farm areas in 1949 against 2.7 per cent today and at the former date these crops accounted for 25 per cent of the farm income, as against only 6 per cent today.



Going a little further and looking at Malvern County as a whole, we find that sheep numbers increased from 190,200 in 1949-50 to 274,500 in 1954-55, a 44 per cent increase in 5 years ; a considerable part of this increase can be attributed to the adoption of improved dryland farming methods on. the light lands of the county.

With new methods and techniques it sometimes happens that there are hindrances to their full exploitation, and this is the case with the exploitation of the improved light land farming methods. In many areas with the increasing number of stock being carried it is apparent that one of the major hindrances is the inadequacy of stock water. To attain the potential carrying capacity of these soils under good dry land farming techniques it will be necessary for water supply schemes to be installed to serve many thousand acres.

We do not propose to go into the economics of

these schemes, but with a Government subsidy of El to £2 which local authorities can obtain in certain circumstances for the installation of a piped water supply in the areas they control, and drawing this water from rivers, we consider such schemes to be a sound economic proposition from the point of view of the farmers 'served by them.

Irrigated Farms

This brings us to the last stage in the economic development of the light lands, that being irrigation. Subsequent speakers will cover much more adequately than we can the technical and practical problems associated with irrigation in Canterbury, but we consider at this stage that it is fair comment to say that as the pressure increases on our land resources, the irrigation of most of the light soils is inevitable.

However, to obtain and use irrigation water is costly. First there is the cost to the State to construct irrigation races to draw water from our rivers and bring it to the farms. On the basis of present costs an estimated State expenditure of about £15 million may not be far from the mark to construct irrigation schemes to irrigate the balance of 550,000 acres of light lands not already served by irrigation schemes. That is only a start; the farmer has to prepare his land. To border dike his fields at present costs about £5 5s. per acre, additional subdivision of fields will be required, additional houses will be necessary for the extra labour, and so it goes on. In fact it is a case of altering the capitalisation of a farm to a much more intensive system of farming.

The capitalisation of the irrigated farms included in the survey is given in the table. While these farms are serviced to irrigate 75 per cent of their farm areas, this does not mean that this area is irrigated each year. Also we consider they could be serviced to irrigate 90 per cent of their farm areas.

Table 3—Capital Structure per Acre of Irrigated Farms (75 per cent Irrigated)

	£ N.Z.	$ U.S.
Unimproved value of land	20.4	57.12
Improvements on land	26.0	72.8
Livestock	12.3	34.44
Plant	5.3	14.84
	64.0	179.2

These farms are carrying an average of 3.8 ewe equivalents per acre, with some carrying up to 4.2; they are producing about 34.4lb of wool per acre and are fattening about 1.8 lambs to the acre, giving 70.5lb of lamb meat; some are producing over 1201b of lamb meat per acre, Also these irrigated farmers are receiving approximately 18.5 per cent of their farm income from the sale of pasture seeds and cereal crops, against about 5 per cent from these sources on the improved dryland farms. The owner surplus per acre is about £6 8s. with some reaching over £14 per acre.

Where State expenditure is required to effect improvements to the productive capacity of land, it is necessary to go further than consider the individual farm; the nation's viewpoint must then be taken. We have endeavoured to do this for the 850,000 acres of light land, and have done it in two stages:

1. We assessed the potential production assuming the present irrigation schemes in Canterbury are fully exploited on approximately 98,000 acres and efficient dry land farming methods are adopted on the balance of 750,000 acres.

2. Also we assessed potential production on the basis of approximately 627,000 acres being- eventually served by irrigation water, and this fully exploited, and efficient dry land farming methods adopted on the balance of 223,000 acres.

The table shows the results of our computations and, perhaps, our crystal gazing:

Table 4-Present and Potential Production on 850,000 Acres of Light Canterbury Soils

	Present	Potential of present irrigation schemes and good dry land farming	Potential with full exploitation of irrigation and good dry land farming
Ewe equivalents	1,390,000	2,180,000	3,330,000
Bales of wool .	45.000	68,000	105,000
Fat lambs .	930:000	1,530,000	2,250,000

Our farmer friends may say to us, "What is the cost to reach this 3.3 million ewe equivalents?" We did estimate costs to both the State and the farmer to bring irrigation water eventually to approximately 627,000 acres of light land, but we are going to be realistic and not quote them. By the time additional irrigation schemes are constructed, the £1 may have depreciated still further, so that our estimates of so

many £ millions may be doubled or trebled. From the nation's point of view we shall let the case rest on the increases in physical production which should be possible.

Summary

In an endeavour to summarise, we have used this table which sets out in a simple manner, the three stages in the economic evolution of farming on the light lands.

Table 5-Carrying Capacity and Owner Surplus per Acre on Three Classes of Farms on Light Lands

	Carrying capacity Ewe equivs. per acre	Owner surplus per acre
		£
Unimproved	0.9	1.3
Improved	2.3	4.1
Irrigated	3.8	6.4

The farmer on the unimproved farm with most of his pasture comprising browntop, danthonia, etc., carries the equivalent of just under 1 ewe per acre and receives an owner surplus of £1 6s. per acre. The farmer on the improved light land farm using the latest methods at present carries approximately 2.3 ewe equivalents per acre and receives an owner surplus of just over £4 per acre. On the last step in the light land farming ladder the irrigation farmer with about 75 per cent of his farm serviced for irrigation at present carries about 3.8 ewe equivalents per acre and receives £6 8s. per acre owner surplus.

However, we admit that this is an over-simplified picture, for other factors must be considered. If we exaggerate to make a point, the farmer on the unimproved farm, within reason, can sit on his front verandah and watch the wool grow at the same time uttering a prayer that he will receive about 8in. of rain evenly spread between October and January, while the irrigation farmer, if he has any spare time during his 24-hour day in the summer, will be invoking his God or the devil that some bright engineer or scientist will soon discover the answer of applying automation to irrigation.

Nevertheless, if irrigation water is brought to approximately 627,000 acres of light land, and improved dryland farming methods are fully exploited on the balance of 123,000 acres which present engineer-

ing difficulties to irrigation, the light soils should be capable of carrying nearly 2 million additional sheep, producing annually another 60,000 bales of wool, and a further 20,000 tons of meat besides cereal crops and small seeds, and on present prices should put another £5 to £7 million per annum in the Canterbury pocket.

DISCUSSION

Q. As we increase production on our farms so the size of the farm decreases and as you bring in irrigation so the size of the farm tends to decrease still further. For improved farms the average size is 300-400 acres, for unimproved 800 acres. Extra production is what we really want surely? Is there not less surplus to the occupier on an irrigated farm?

A. (Scott): Yes, you are correct. The irrigation farms tend to get smaller. If you look at an unimproved farm at the present time it looks as if the farmer is doing quite well and one wonders whether he should use irrigation water. However we have got to take the national point of view; increased national production is our aim.

Q. Could there be a point which might be a little misleading regarding irrigation? Why do we not all irrigate? There is the extra effort and extra labour which the farmer himself puts into an irrigated farm. Extra labour is 'usually done by the farmer or his family due to the fact that it is a small area. If labour is fully costed, would the extra surplus from irrigation as against improved dry land be worthwhile.

A. (Stuart): Not enough fully irrigated farms in Canterbury have been studied to enable us to get a proper picture. Most fully irrigated farms we know are employing no more paid labour than dry-land farmers.

Q. Should it not be a comparison basically between irrigated farms and improved dry land farms? Surely the comparison between farmer occupiers on irrigated and non-irrigated farms should be expressed by their increments over dry land farms and unimproved dry land farms?

A. (Scott): The improved dry land farms still have a long way to go. So have some of the irrigated farms.

Q. What costs have been taken for the actual water in arriving at the owner surplus of £6 4s. per acre?

A. (Stuart): Most of the irrigated farms in Canterbury were introduced in the cheaper labour days in the 1930's and 1940's. The rate then of 4/- per acre. foot is now 9/-. The projected scheme would be approximately £1 per acre foot. We took what the farmer actually paid. Assessing increased production on the projected price of £1 per acre foot the cost of water would only comprise 8 per cent of the total expenditure.

Q. The sheep numbers for Malvern County have risen 44 per cent in the last 5 years; what is the- increase, if any, for the rest of Canterbury over the same period?

A. (Stuart): I cannot tell you exactly, but nothing in that vicinity. Canterbury probably has had about a 12 per cent increase over the same period.