FINANCIAL ASPECTS OF PASTURE IMPROVEMENT ON SOUTHERN WHEAT-SHEEP FARMS*

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1. SUMMARY

The purpose of this report is to discuss the financial benefits and costs of pasture improvement on south-western wheat-sheep farms in New South Wales. Pasture can be improved in many ways. All of them require some capital investment. An attempt is made to give typical costs and returns for the sowing of a Subterranean Clover—Wimmera Rye pasture; one of the most common forms of pasture improvement. While the returns and costs used apply to the wheat districts of southern New South Wales it is believed that the problems discussed are of wider interest.

Pasture improvement provides an economic way of raising soil fertility and thus enables landholders to increase the productivity of their most important asset. In southern New South Wales increases in stock numbers of 100 to 200 per cent as a result of pasture improvement have been common. Better nutrition of the increased stock carried has also led to increased wool, meat and/or milk production per animal. In addition, country previously suitable only for dry sheep has often been transformed into breeding and fattening country for both beef cattle and sheep, thus opening up completely new opportunities of diversification. Crop yields on pasture improved lands have shown substantial increases.

An attempt is made to assess the profitability of pasture improvement on a 900-acre wheat-sheep farm assuming typical yields, costs and carrying capacity. Prices for wheat, wool and fat lambs are taken at average 1955-56 levels and costs of seed, fertiliser, freight, materials and labour as those ruling in September, 1956. With these levels of prices and costs a fully improved 900-acre wheat-sheep farm will provide approximately £1,650 more net income annually (i.e., an increase of 80 to 100 per cent) than a farm of the same size with no improved pastures.

While pasture improvement in the south-west wheat belt is therefore a very profitable investment at present costs and 1955-56 price levels, the lags between costs and returns are such that a sizeable and continuing pasture improvement programme imposes a heavy strain on the farmer's cash resources. If 100 acres are sown to pasture in one year, the cost of seed, superphosphate, extra sheep and the additional expenses connected with running more sheep (e.g., crutching, shearing, etc.) will exceed the additional returns from this pasture for four years. It is only in year five (and succeeding years) that the sowing of 100 acres of pasture will yield returns exceeding the additional expenses incurred. While a large proportion of the additional expenses incurred are of a capital nature, they constitute the same drain on the farmer's cash resources as recurring expenses.

Under a *continuing* programme of pasture improvement the time which will elapse before annual returns exceed costs is considerably greater. On a 900-acre wheat-sheep farm an improvement programme involving the sowing of 100 acres of pasture annually will produce a financial drain for the first eight years. If the whole programme is financed by means of an overdraft and 5 per cent interest is added to

each year's balance, an overdraft limit of £3,500 will be required. If all additional income from pasture improvement is used to reduce the overdraft it will be paid off in 12 years.

The costs and returns of a number of other pasture improvement programmes are given in the text. In every case examined, pasture improvement requires substantial initial expenses which will not be fully recouped for 8 to 12 years.

The figures given suggest that pasture improvement is a long-term investment which may require substantial capital reserves or ability to borrow, even on small farms. However, these considerations should not be allowed to obscure the fact that pasture improvement is a very profitable *long-term* investment, at present costs, even if wool prices remain at the comparatively low levels of the 1955-56 season. In fact, pasture improvement in the southern wheat belt would still be profitable if wool and fat-lamb prices fell by 30 or 40 per cent and costs remained at present levels.

In Appendix I the results of a mail survey of wheat crop correspondents are discussed. These farmers were contacted to ascertain the increases in carrying capacity which had been obtained in the first four years of pasture improvement. In Appendix II some of the effects of taxation on one of those pasture improvement programmes are discussed.

2. INTRODUCTION

Pasture can be improved in many ways, all of them requiring some capital investment. At the most costly extreme, uncleared land can be purchased, prepared for cultivation and a suitable pasture mixture sown on a prepared seed bed which is also treated with fertiliser and possibly with trace elements.

At the other extreme the capital investment incurred may consist only of the purchasing of pasture seed which is sown at the same time as a cereal crop as part of a normal crop rotation programme. There are many other possibilities such as the sowing of seed with limited cultivation (e.g., by combine or sod seeder) and the surface or aerial broadcasting of seed and/or fertiliser, which fall between these two extremes in terms of investment costs per acre. These different degrees of improvement involve different expenses and returns. An attempt will be made to give typical costs and returns for one of the most common forms of pasture improvement.

"The major soil groups of Australia have relatively low levels of fertility. There are exceptions such as the red loams and the black earths but in general the elements essential for plant growth are deficient for normal crop production. The native fauna and flora are adapted to such conditions. . . . . Australian soils are generally inadequately

supplied with phosphates and nitrogen; over the past 20 years evidence has accumulated on the deficiency in specific soils of manganese, copper, cobalt, zinc, boron and molybdenum."[1]

These deficiencies can in most cases be overcome by the use of fertiliser and trace elements. But the correction of nitrogen deficiency by means of fertiliser application is often not economical. One of the main benefits of pasture improvement is that it enables landholders to raise the nitrogen content of their soils profitably and to increase the productivity of their most important asset. This increased productivity manifests itself in many different ways. Probably the most spectacular is the increase in the number of stock which can be carried. In southern New South Wales increases in stock numbers of 100 to 200 per cent as a result of pasture improvement have been common. On most properties in New South Wales pasture improvement has been introduced comparatively recently. As the build-up of soil fertility tends to be continuous, further benefits from these improvements may be expected in the future.

Pasture improvement has also led to better nutrition of the increased stock carried. This shows itself in increased wool and meat production per animal, and the transformation of country which previously carried only dry sheep into breeding and fattening country. In many cases this opens up completely new opportunities of diversification to the property owner. Reliance on the annual wool cheque can—if desired—be reduced; fat lambs and fattening of beef cattle become practical possibilities.

On wheat-sheep farms the improvement in fertility can be observed in a substantial increase in wheat yields after land has been under a leguminous pasture for a number of years. On 31 wheat-sheep farms where wheat has been grown after subterranean clover pasture phases of varying lengths, the average improvement in yields was estimated by the farmers at 9.6 bushels per acre.[2]

Evidence from property sales shows that prospective buyers are becoming increasingly aware of the value of pasture improvement. Improved properties in the high rainfall areas of southern New South Wales tend to sell for £5 to £10 an acre more than similar properties which have not been improved. In wheat-sheep areas differentials are somewhat smaller reflecting the lower costs of improvement in these districts. Apart from the increased output made possible by pasture improvement, the enhanced prospective capital value of the asset provides an incentive for investment in pasture improvement.

Though the gains mentioned above are very spectacular and, as will to be shown later, pasture improvement remains a very profitable investment at 1956 levels of prices and costs, the adoption of an improvement programme necessitates considerable changes in farm organisation and the acquisition of new skills by land holders. Some of the financial

[1] *The Australian Environment* (Melbourne: CSIRO, 1950), p. 45.

[2] See Appendix I.

problems involved are outlined below. A factor which should be mentioned here is that the greater volume of feed and the greater concentration of animals resulting from pasture improvement leads to added risks from foot ailments. The better levels of nutrition can also aggravate worm infestation and other diseases. While these difficulties can usually be avoided this requires higher standards of stock and pasture management than have often prevailed in the past.

3. FINANCIAL RESULTS

Benefits in the Long Run

As mentioned earlier, the benefits obtained from pasture improvement are continuous in the sense that the build-up of fertility achieved increases as long as the pasture sown is fertilised and properly managed. At some stage a high plateau of fertility will perhaps be reached where no further improvement is possible or profitable. This is only of theoretical interest at present as most farmers are still at an early stage of their improvement programme. In a sense it is therefore artificial to take any point of time and compare costs and returns at this stage with costs and returns before the pasture improvement work has begun. Such a procedure will nevertheless be adopted here because it makes possible an assessment of the profitability of pasture improvement. Data are as yet not available showing the increases in productivity which can be achieved under farm conditions after a pasture has been sown for more than say eight to ten years. Any increases in productivity after this period will therefore increase the profitability of pasture improvement above the levels suggested here.

The example given refers to a 900 acre wheat-sheep farm. It is assumed that the whole farm consists of arable land. Prices used for wheat, wool and fat lambs are taken at the average levels prevailing in 1955-56.[3] Yields and stocking rates assumed are based on average conditions in those sections of the southern wheat belt where pasture improvement is impossible. The increases in carrying capacity resulting from pasture improvement were obtained from mail

[3] The prices given in Table I may appear surprisingly low. This is the result of using the estimated price received by the farmer after paying freight, commission, etc. instead of the more familiar prices quoted for most farm products at the point of sale (usually at capital cities). In the case of wool for instance the price the grazier receives is about 6d. per lb. less than the price realised on the auction floor. The difference is accounted for by rail and road freight, warehousing costs, broker's commission, fire insurance and the cost of jute packs. In the case of wheat the estimated return of 9s. per bushel to the grower corresponds to a price of 12s. 9d. per bushel at principal ports. Of the difference 1s. 10½ is accounted for by railfreight, 1s. 3d. by bank interest, handling, storage and administrative expenses, and the remainder by the cost of bags, cartage to railhead, etc.

questionnaires sent to Departmental crop correspondents.[1] Instead of constructing typical budgets before and after pasture improvement, the gross income before and after pasture improvement will be compared, and allowance will be made for expenses associated with increased stocking rates, pasture improvement and reduced wheat acreages.

TABLE I

Gross Income under Old Rotation

(900 Acre Wheat-sheep Farm)

	Gross Income £
Annual area under wheat : 300 acres. Yield : 15 bushels per acre = 4,500 bushels at 9s. od. per bushel	2,025
Annual area under fallow : 300 acres carrying 200 crossbred ewes and lambs.	
Annual area under volunteer pasture : 300 acres carrying 200 crossbred ewes and lambs = 400 crossbred ewes producing 8lb. of wool at 4s. od. per lb.	640
75 per cent. lambing = 300 lambs sold at £3 10s. od. each ...	1,050
Gross Income	3,715

Until recently the common practice on farms of this size and type has been to crop fairly intensively. Long fallows and a wheat rotation of one in three have been usual (i.e. wheat-ley-fallow-wheat). In Table I the gross income a farmer can expect to receive under such a rotation is given. With the introduction of a pasture improvement programme a longer pasture phase will be required to build up fertility. But it is possible to put a paddock under wheat for two successive seasons after such a pasture phase. A possible rotation under these circumstances is wheat-Subterranean Clover, Wimmera Rye pasture for six years-fallow-wheat-wheat. The gross income which can be expected under such a rotation is given in Table II.

[1] cf. Appendix 1. The estimated average increase in stock numbers carried was two dry merino sheep (or their equivalent in terms of breeding ewes) per acre (over a four year period). However many crop correspondents mentioned that the very good seasonal conditions during the last ten years have contributed to this substantial increase. For the purpose of the calculations in this paper the average increase resulting from pasture improvement was therefore arbitrarily reduced to 1½ dry merino equivalents per acre.

The increase in wheat yields resulting from pasture improvement which is used here has also been reduced—partly for the same reason (i.e. seasonal conditions). In addition some of the crop correspondents mentioned that skeleton weed had so reduced wheat yields without pasture improvement, that wheat growing on unimproved country had to be discontinued. These correspondents gave the biggest estimates of increases in wheat yields due to pasture improvement. As the intention of this paper is to compare the financial position of *wheat-sheep* farmers before and after pasture improvement, it was decided to ignore these cases. On farms where skeleton weed infestation is very serious this of course provides an additional incentive for pasture improvement which is not considered here.

TABLE II

Gross Income under New Rotation

(900 Acre Wheat-sheep Farm)

	Gross Income.
	£
Annual area under wheat : 200 acres. Yield : 20 bushels per acre = 4,000 bushels at 9s. 0d. per bushel	1,800
Annual area under fallow : 100 acres carrying 50 crossbred ewes and lambs.	
Annual area under improved pasture : 600 acres carrying 900 crossbred ewes and lambs = 950 crossbred ewes producing 10 lb. of wool at 4s. 0d. per lb.	1,900
75 per cent. lambing = 712 lambs sold at £4 each	2,848
Gross Income	6,548

Gross income under the new rotation is almost 60 per cent higher. Approximately 90 per cent of this gain is the result of the increase in carrying capacity due to pasture improvement (and the resulting increase in wool and fat lamb production). The remaining fraction is attributable to higher prices which can confidently be expected for better fed lambs and to the rise in wheat yields. Proper pasture management under the new conditions will probably require the use of some beef cattle (approximately 30-40 head) in addition to (or instead of part of) the increase in sheep numbers. This has been ignored in the financial analysis because it is not likely to affect the overall profitability and would unduly complicate the discussion.

Before it is possible to assess the profitability of the new rotation some allowance must be made for the different expenses which will be incurred under the longer rotation. The relevant figures are given in Table III. The expenses associated with the new rotation can be divided into three groups. Firstly, the increased expenses resulting from pasture development; namely, fertiliser and the cost of spreading it and seed. Of these fertiliser is the most important item. Secondly, there are increased stock expenses. Where fat lamb production and wheat growing are combined the usual procedure is for farmers to purchase fat lamb mothers. In the case where a farmer breeds his own ewe replacements this cost could be reduced, but the number of fat lambs for sale would also be reduced somewhat. Other costs included in this category are losses on the increased stock numbers, shearing, crutching costs and chemicals for drenching, etc. and lastly costs of purchasing additional rams. The shearing and crutching costs used are based on contract rates. Some economies are possible here if the farmer undertakes these operations

TABLE III

Comparison of Long Term Financial Results under Two Different Rotations (900 Acre Wheat-sheep Farm)

Change in Expense Item	£	Income Differential with Longer Rotation
Gain in gross income under pasture improvement (*i.e.*, £6,548 — £3,715)		+ 2,833
Increased Pasture Improvement Expenses—		
600 acres topdressed at 90 lb. per acre annually...	= 600	
Cost of seed (3 lb. subterranean clover, 2 lb. Wimmera Rye) at 12s 6d. an acre over 600 acres = £375.		
Annual cost $\left(i.e., \frac{375}{6}\right)$	= 63	
		— 663
Increased Stock Expenses—		
Purchase of 550 additional ewes at £5 each = £2,750 less assumed sale value of £2 each (*i.e.*, £1,100) = £1,650 spread over 4 years (assumed life of ewe)	= 413	
5 per cent. annual losses on 550 additional sheep at £3 a head	= 83	
Shearing, crutching and chemicals at £40 per 100 sheep	= 220	
Cost of extra rams (2 per cent.) at £30 each— assumed life 3 years	= 110	
		— 826
Reduced Wheat Growing Expenses—		
82s. 0d. per acre for 100 acres less wheat (cost of harvest labour, machinery maintenance, fuel, seed, fertiliser)	= 410	+ 410
Net Annual Gain with Longer Rotation		1,754

himself and hires casual labour. The third major item of changed expenditure is wheat growing. The figures used in this section were based on average costs given in the Wheat Costs of Production Survey carried out by the Bureau of Agricultural Economics (adjusted to 1955-56 price levels).

After allowance is made for these expenses the estimated net annual gain with pasture improvement and longer rotations is £1,754. The expenses allowed for so far are those which *must* be incurred in a pasture improvement programme on this type of property. In addition there are certain other costs which may have to be met under some conditions. The extra sheep run will require more water. On some properties this will be available from natural water courses; in other cases it will be necessary to provide extra dams or other watering facilities. For 550 extra sheep extra storage capacity of 2,000 cubic yards should be ample. At a contract rate of 2s. 6d. per cubic yard the

extra capital cost would be £250. More subdivision fencing will also probably be necessary. To double the number of paddocks on a 900 acre farm may require 2½ miles of additional fencing. Costs of materials and contract labour for a 2-barbed, 4-plain wire fence are approximately £300 per mile. The capital cost of additional fencing may therefore amount to £750.

For the purpose of an assessment of long term profitability the annual costs which should be taken into account are—interest on the capital cost of dams and fencing (5 per cent on £1,000 = £50) ; depreciation on fencing (3 per cent. on £750 = £22½) ; and repairs to fences (say £25 annually). From the estimated net annual gain of £1,754 approximately £100 should therefore be deducted for annual costs which may be incurred on fencing and water supplies.[5]

Short Term Costs and Returns

Apart from the fundamental question of the long-term profitability of a particular investment, any producer is concerned with the length of time before returns will come in to compensate him for his original outlay. The agricultural producer is particularly interested because, unlike the majority of industrial producers, his liquid capital resources are usually small and cannot be augmented by the issue of shares and debentures. Bank credit can be and is being used to supplement these resources, but only to a limited extent. Theoretically, overdrafts are repayable on demand. While this is usually of little practical consequence many farmers will hesitate to undertake an investment programme which will require bank accommodation of several thousand pounds for an eight to ten year period. Unless a farmer possesses liquid funds or is able to save a substantial sum out of current income, an overdraft limit of approximately £3,500 for about ten years will be required to finance the type of pasture improvement programme (on a 900 acre wheat-sheep farm) which was outlined earlier.

Sowing 100 Acres of Pasture

Before discussing the costs and returns of such a programme for individual years it is advisable to show the lag between costs and returns when 100 acres are sown to pasture. The relevant figures are given in Table IV. The costs and prices used in the construction of this table are the same as those used throughout this article. The annual increase in sheep numbers resulting from pasture improvement is based on information obtained from 71 Departmental crop correspondents. (See Appendix I)

[5] The amount spent on additional fences and water supplies can vary substantially between different farms of the same size. The existing fences and watering points will, largely, determine the amount necessary. In some cases fairly substantial alterations in watering facilities will be needed. For instance some farmers have found that the increased vegetative cover resulting from pasture improvement has reduced surface run-off so greatly that other sources of water have to be found—apart from increasing water storage for a larger stock population. However, even if the amount spent on these items greatly exceeds the allowance made here it should not appreciably affect the long term profitability of pasture improvement.

The only additional expense incurred as a result of pasture improvement in the first year is pasture seed; the costs of cultivation and fertiliser would have been incurred as part of the normal crop rotation. In the second financial year the main expense is superphosphate (and the cost of spreading it). A small number of additional sheep are bought and some additional expenses will be incurred for crutching, drenching, etc. The additional ewes purchased in the second year will normally not produce a cash return (i.e., either from the sale of wool or fat lambs) until the third (financial) year. In the third and fourth years substantial additional outlays on the purchasing of breeding ewes and superphosphate will be necessary—while the increased income from wool and fat lambs will still be comparatively small. The fifth year after the pasture improvement programme has commenced will be the first in which the annual returns attributable to pasture improvement exceed annual costs.[6] The total cash outlay resulting from pasture improvement will not be recouped until the eighth year. From the fifth year on expenses will fluctuate according to the number of breeding ewes and rams which have to be replaced; on the average returns will exceed expenses by £187 annually.

A Continuing Programme of Pasture Improvement

Under a *continuing* programme of pasture improvement the time which will elapse before annual returns (attributable to pasture improvement) exceed annual costs may be as long as eight years. The additional expenses resulting from pasture sowings in the third, fourth and fifth years exceed the returns from earlier sowings. It is only when returns from the third year's sowings have reached their maximum level that total returns exceed expenses.

When the short term costs and returns of a continuing programme of pasture improvement are examined an additional factor has to be considered. That is the effect of pasture improvement on the area which can be sown to wheat. Reverting to the example of the 900 acre wheat-sheep property one finds that additional costs arise because the sowing of pasture entails some reduction in wheat sowings.[7] The extent of the reduction in wheat acreage will depend on the rate of expansion of pasture improvement. Thus, if the farmer sows 300 acres to pasture annually—i.e., the whole of his annual wheat acreage—he will have to stop wheat growing temporarily in the fourth year—or plough up pasture which is still improving its carrying capacity at a rapid rate. A somewhat slower rate of pasture sowings will enable these costs (of foregoing wheat sowings) to be reduced, but on a small, intensively cropped property some temporary drop in income from wheat is inevitable.

The financial results obtained by sowing different acreages of pastures annually (on a 900 acre farm) are given in Table V. Four different pasture improvement programmes are compared. In the first case 300

[6] This is not, of course, a true reflection of the *income* position. The purchase of sheep represents an investment which should not—from an accountancy point of view—be debited against a single year. However, we are here concerned with the drain on the farmer's cash resources.

[7] On larger farms where a less intensive rotation is practised originally no reduction in wheat sowings will be necessary. This point is elaborated below.

TABLE IV

Annual Costs and Returns from Sowing 100 *Acres of Pasture*

(With a Wheat Crop)

Financial Year	Increased Expenses									Increased Income				Net Effect on Cash Position	Extra Ewes Run at End of Year
	Seed*	Super-phosphate†	Extra Ewes Bought‡	Ewe Replace-ments	Shearing Costs§	Crutching and Chem-icals‖	Extra Rams Bought¶	Ram Replace-ments	Increased Sheep Losses**	Wheat	Wool	Fat Lambs	Sale of Cast-for-age Ewes ††		
	£	£	£	£	£	£	£	£	£	£	£	£	£	£ s. d.	
1	— 62·5	...	...	...	...	...	...	...	...	...	...	...	...	— 62 10 0	...
2	...	— 100	— 40	...	...	— 1·6	...	...	...	...	...	...	...	— 141 12 0	8
3	...	— 100	— 125	...	— 1·6	— 6·6	...	...	— 3	...	+ 16	+ 24	...	— 196 4 0	33
4	...	— 100	— 165	...	— 6·6	— 13·2	— 30	...	— 9	...	+ 66	+ 96	...	— 161 16 0	66
5	...	— 100	— 85	...	— 13·2	— 16·6	— 30	...	— 12	...	+ 132	+ 196	...	+ 71 4 0	83
6	...	— 100	...	— 40	— 16·6	— 16·6	...	...	— 12	...	+ 166	+ 248	+ 16	+ 244 16 0	83
7	...	— 100	...	— 125	— 16·6	— 16·6	...	— 30	— 12	...	+ 166	+ 248	+ 50	+ 163 16 0	83
8	...	— 100	...	— 165	— 16·6	— 16·6	...	— 30	— 12	...	+ 166	+ 248	+ 66	+ 139 16 0	83

* 3 lb. of subterranean clover, 2 lb. Wimmera Rye per acre = 12s. 6d. per acre.

† 90 lb. per acre; cost includes spreading = £1 per acre.

‡ Sheep bought off shears in November/December at the rate of £5 each.

§ At the contract rate of £20 per 100 sheep shorn. (Number of sheep taken from number of ewes at end of *previous* financial year).

‖ At the rate of £20 per 100 sheep. (Number of sheep taken from number at the end of each financial year).

¶ At the rate of £30 each (2 per cent rams).

** 5 per cent of extra ewes at end of the year—replaced at cost of £3 each.

†† At the rate of £2 each.

acres of pasture are sown a year for three years. Cultivation is then suspended until the pasture laid down in the first year is six years old when the new crop rotation envisaged in Table II is commenced (i.e. 200 acres of wheat cropped annually and 100 acres sown to pasture). The second programme consists of sowing 150 acres of pasture a year for six years and reverting to the new crop rotation at the end of this period.

The third programme consists of sowing 100 acres of pasture a year for nine years and then following the new crop rotation. In the last programme, 100 acres are sown to pasture for three years. It is assumed that because of mounting expenses the farmer then decides to sow no more pastures until the initial investment has been recouped.

For each of these four examples, two financial results are given in Table V. The first one (called "Annual Cash Position") gives the balance of additional annual expenses and receipts resulting from the pasture improvement programme.[8] The second financial result given for each pasture improvement programme shows the level of an overdraft at the end of each financial year on the assumption that all expenses relating to pasture improvement are financed by means of bank credit and that 5 per cent is added to the outstanding balance at the end of each financial year. All additional income from pasture improvement is used to pay off the overdraft.

An examination of Table V shows that in each of the four pasture improvement programmes given, additional annual expenses exceed receipts for at least six years. A farmer financing any of these programmes by means of bank credit would require accommodation for at least ten years, if he relied solely on the additional income from sowing pastures to pay off his overdraft. (This takes no account of the fact that he would have to pay tax on the additional income produced; on the other hand his expenses can be deducted for tax purposes. The effect of taxation on the profitability of one of these programmes is discussed in Appendix II.)

Although the most rapid pasture improvement programme requires the largest overdraft, it is the quickest to show positive returns. When 300 acres are improved annually, returns will exceed expenses in the seventh year; when 150 acres are improved, in the eighth year; and when 100 acres are improved annually, in the ninth year. In the first case the overdraft will be paid off in the tenth year, in the second in 11 years, and in the third it will take 12 years.

When pasture improvement is interrupted after a third of the farm has been sown (the fourth case) returns will exceed expenses from the seventh year onwards. The maximum overdraft requirement will be £2,140, as compared with £3,570 when the 100-acre a year programme is continuous. Where pasture improvement is interrupted the overdraft will be paid off in the eleventh year. However, after ten years, the

[8] This column corresponds to the column of Table IV giving the "Net Effect on Cash Position". Detailed financial tables giving annual costs and returns for each of these pasture improvement programmes are given in Appendix III.

TABLE V

Financial Results with Different Rates of Pasture Sowings (900 Acre Wheat-sheep Farm).

Financial Year	300 Acres a Year (For Three Years)		150 Acres a Year (For Six Years)		100 Acres a Year (Continuous)		100 Acres a Year (For Three Years)	
	Annual Cash Position	Level of Overdraft at End of Year	Annual Cash Position	Level of Overdraft at End of Year	Annual Cash Position	Level of Overdraft at End of Year	Annual Cash Position	Level of Overdraft at End of Year
	£	£	£	£	£	£	£	£
1	— 187	196	— 94	99	— 63	66	— 63	66
2	— 620	857	— 305	424	— 204	283	— 204	283
3	— 1,269	2,232	— 637	1,114	— 449	769	— 449	769
4	— 1,532	3,952	— 858	2,071	— 556	1,391	— 494	1,326
5	— 1,600	5,830	— 1,129	3,360	— 740	2,238	— 532	1,951
6	— 120	6,248	— 759	4,325	— 524	2,900	— 87	2,140
7	+ 1,410	5,079	— 140	4,688	— 306	3,366	+ 264	1,970
8	+ 2,272	2,947	+ 1,243	3,617	— 35	3,571	+ 283	1,771
9	+ 1,976	1,020	+ 1,816	1,891	+ 485	3,240	+ 1,311	483
10	+ 1,636	paid off	+ 1,718	182	+ 1,528	1,798	+ 873	paid off
11	+ 1,889	.....	+ 1,666	paid off	+ 1,712	90	+ 862	.....

earning capacity of the farm has, in the first three cases, been improved by approximately £1,700 per annum, whereas in the fourth case the improvement is in the neighbourhood of £750.[9]

Table VI gives the financial results for the same four pasture improvement programmes on an 1,800-acre wheat-sheep farm. The main difference between this case and the 900-acre farm is that no losses of income arise as a result of a curtailment of wheat acreages. The effect of this can be seen particularly clearly when comparing a rapid improvement programme on the two different-sized properties. The farmer with 1,800 acres sowing 300 acres a year will incur a slightly heavier financial load than the farmer with 900 acres sowing 300 acres a year. (Maximum overdraft of £7,121 as opposed to £6,248.) But after ten years the earning capacity of the smaller farm has been increased by approximately £1,700 a year, whereas the earning capacity of the larger farm has increased more than twice as much as this.

On the larger farm the interruption of a pasture improvement programme, as envisaged in the fourth case, will enable the overdraft to be paid off in the ninth year—one year earlier than on the 900-acre farm (and the maximum overdraft requirement will be approximately £500 lower).

For purposes of comparison Table VI is based on the same assumptions as Table V. However, in one respect these assumptions are unrealistic for the larger farm used in Table VI. On an 1,800-acre property where the whole farm area is improved, crossbred ewe numbers will be increased by 1,500 by sowing pasture. To run 1,500 additional ewes and look after them at lambing time will require more labour. Two permanent men or one man with assistance during critical seasonal periods can probably handle the extra sheep. This would reduce the net annual gain from pasture improvement—on an 1,800-acre farm—to approximately £3,000 (excluding the costs of increased fencing and water supplies).

On a 900-acre farm it seems reasonable to assume that the farmer can look after 550 additional crossbred ewes by himself, as allowance has been made for shearing, crutching and superphosphate spreading by contract and the acreage under wheat has been reduced.

4. CONCLUSION

The figures given above emphasise that—even on small farms—pasture improvement is a long-term investment which may require substantial capital reserves or the ability to borrow equivalent amounts. A wheat-sheep farmer in southern New South Wales undertaking any sizeable continuing pasture improvement programme at present prices and costs can expect to be financially worse off for six to ten years

[9] In these calculations no allowance has been made for the increased costs which may have to be incurred for water supplies and fencing. These expenses would, of course, prolong the period for which an overdraft would be required. They have not been taken into account in this short-term statement of costs and returns because in some cases they will not be needed and because expenditure on fencing can, if necessary, be delayed somewhat.

TABLE VI

Financial Results with Different Rates of Pasture Sowings (1,800 Acre Wheat-sheep Farm).

Financial Year	300 Acres a Year		150 Acres a Year		100 Acres a Year		100 Acres a Year (For Three Years)	
	Annual Cash Position	Level of Overdraft at End of Year	Annual Cash Position	Level of Overdraft at End of Year	Annual Cash Position	Level of Overdraft at End of Year	Annual Cash Position	Level of Overdraft at End of Year
	£	£	£	£	£	£	£	£
1	— 187	196	— 94	99	— 62	65	— 62	65
2	— 620	857	— 306	425	— 204	282	— 204	282
3	— 1,269	2,232	— 637	1,115	— 448	767	— 448	767
4	— 1,719	4,149	— 859	2,073	— 556	1,389	— 494	1,324
5	— 1,427	5,855	— 732	2,945	— 474	1,956	— 267	1,671
6	— 677	6,859	— 363	3,473	— 259	2,326	+ 178	1,568
7	+ 77	7,121	— 129	3,782	— 40	2,484	+ 529	1,091
8	+ 1,667	5,727	+ 229	3,731	+ 75	2,529	+ 548	543
9	+ 2,922	2,944	+ 408	3,489	+ 300	2,340	+ 554	paid off
10	+ 4,054	paid off	+ 767	2,858	+ 565	1,864	*	.....
11	+ 4,313	.....	+ 1,061	1,887	+ 805	1,120	*	.....

* Not given; depends on future pasture improvement programme.

than he would be otherwise. The capital value of his property will be increased considerably but this will entail a temporary drain on cash reserves or recourse to borrowing.

These considerations should not be allowed to obscure the fact that pasture improvement is a very profitable investment. At present, the typical net incomes on an unimproved 900-acre wheat-sheep farm would be between £1,500 and £2,000. Pasture improvement can therefore boost net income—on a farm of that size—by 80 to 100 per cent, at present costs, even if wool prices remain at the relatively low levels of the 1955-56 season.

In fact, pasture improvement would still be profitable if wool and fat-lamb prices fell by 30 or 40 per cent and costs of seed, fertiliser and labour remained at current levels. However, in that case the time required to recoup the original cash outlay would be much greater. There is little doubt that such a drop would have a marked effect on the amount of pasture improvement carried out—but it would still be a profitable investment.

APPENDIX I.

Results of a Mail Survey of Crop Correspondents in Wheat Area

One hundred and seventy departmental crop correspondents were sent a questionnaire regarding the normal carrying capacity of natural and improved pastures on their farms. The correspondents who were approached are situated in those sections of the southern and central wheat belts where pasture improvement has become increasingly popular in recent years. Correspondents in irrigation areas and districts were not included. The purpose of the survey was to obtain information about the increase in stocking rates resulting from pasture improvement under farm conditions, the length of time involved in obtaining increases in carrying capacity and the increase in wheat yields obtained after a clover pasture phase.

One hundred and twenty-eight replies were received. Of these, 34 could not be used, mainly because pasture improvement was not practised or had been undertaken for a short time only. In addition, 18 farmers gave carrying capacities for lucerne-based pastures and five farmers sowed Wimmera Rye only and no legumes. This left 71 usable questionnaires from correspondents with subterranean clover-based pastures. (In some cases other clovers were also present.) These correspondents cannot, of course, be regarded as a random selection of farmers. Crop correspondents have more contact with Departmental officers than the "average farmer" and their practices and quality of management are probably better. The estimates of carrying capacity obtained should therefore be regarded as an indication of the results obtained with good, rather than average, management.[10]

To estimate carrying capacities on a number of farms some unit for comparing different grazing animals is necessary. The unit used is one dry merino sheep. Crossbred sheep and other breeding ewes were converted to that unit. The conversion rates used here were first worked

[10] On the other hand the average application of fertiliser by the crop correspondents was no higher than the average for these districts.

out in Lang, Tulloh and Fennesy's "Survey of the Sheep Industry in the Western District of Victoria" (School of Agriculture, University of Melbourne, Table 119, p. 267).

The average carrying capacities of natural and improved pastures in various stages of development are given in Table I. Natural pastures carried an average of 1.2 dry sheep per acre (or two crossbred ewes to three acres). Four years after pasture improvement had begun an increase slightly exceeding 150 per cent was obtained. Figures for later years were unfortunately not asked for. The greatest increase was recorded in the second year whilst further substantial increases occurred in the third and fourth years.

TABLE VII

Normal Carrying Capacities of 71 Wheat-sheep Farms

(Dry Sheep Equivalents)

Natural Pasture	1·2
Improved Pasture—	
First Year after Sowing	1·5
Second Year after Sowing	2·4
Third Year after Sowing	2·8
Fourth Year after Sowing	3·2
Average Fertiliser Application (67 Farmers)..	83 lb. per Acre per Annum.

The increases estimated by the correspondents are in close agreement with estimates prepared independently by a number of agricultural advisers and research workers who were familiar with these districts. To test the consistency of the farmers' estimates three additional cross tabulations were made. Farmers were classified according to (*a*) the carrying capacity of their natural pastures and (*b*) the amount of fertiliser used and (*c*) the botanical composition of the sown pastures. Comparisons on the basis of these classifications may be expected—on theoretical grounds—to produce certain results and it is possible to check whether the estimates conform to these expectations.

Differences in the carrying capacity of natural pastures in this area are predominantly the result of differences in soils. Rainfall variations would be a comparatively minor factor as the areas concerned exclude the western portion of the wheat belt and the higher rainfall areas to the east of the wheat belt. Differences in soil fertility are likely to be reduced by pasture improvement as nitrogen—one of the major factors responsible for low fertility—is made more freely available. Poorer soils are—on the whole—likely to respond proportionately more to pasture improvement than better soils. In Table VIII the response to pasture improvement is given for three groups of farmers—those with a normal carrying capacity of natural pastures of one dry sheep or less, those between 1.01 and 1.5 sheep per acre and those with a natural pasture carrying capacity exceeding 1½ dry sheep per acre. The figures conform to expectations. The increase in carrying capacity between natural pastures and a four-year-old improved pasture on the poorest soils is 240 per cent, on the next group 135 per cent and on the

best soils 124 per cent. The difference between the second and and third groups is unduly small because those correspondents with the best soils tended to use substantially more fertiliser per acre which would affect the response.

TABLE VIII

Average Carrying Capacities on 71 Wheat-sheep Farms
(Dry Sheep Equivalents)

	Carrying Capacities of Natural Pastures		
	1 Sheep or less	1½ Sheep or less	More than 1½ Sheep
Natural Pastures	·7	1·3	1·9
Improved Pasture—			
First Year after Sowing	1·1	1·5	1·9
Second Year after Sowing	1·8	2·4	3·1
Third Year after Sowing	2·1	2·8	3·8
Fourth Year after Sowing	2·4	3·0	4·2
Average Fertiliser Application ...	83 lb.	72 lb.	103 lb.
Number of Farmers	24	28	19

The second comparison involves the classification of the farmers according to the average annual quantity of superphosphate used per acre. As shown in Table IX the results obtained by means of this classification—namely the largest increases where superphosphate use is greatest—are again in accordance with theoretical expectations. The data in Table IX relate only to 67 correspondents. Two correspondents used no superphosphate after the first year and were excluded from the lowest group; another two did not mention the amount of superphosphate used.

TABLE IX

Average Carrying Capacities on 67 Wheat-sheep Farms
(Dry Sheep Equivalents)

	Average Annual Application of Superphosphate		
	60 lb. or less	61 lb. to 100 lb.	101 lb. and over
Natural Pastures	1·2	1·2	1·4
Improved Pastures—			
First Year after Sowing	1·1	1·4	2·1
Second Year after Sowing	2·0	2·4	3·0
Third Year after Sowing	2·6	2·7	3·6
Fourth Year after Sowing	2·9	3·1	3·9
Number of Farmers	24	23	20

For the third comparison the farmers were divided into two groups according to the botanical composition of the pastures. Farmers who specified species other than, or additional to, Subterranean Clover and Wimmera Rye grass as main pasture mixtures were arbitrarily regarded as possessing balanced pasture swards. This group (10 farmers) was compared with the remaining 61 farmers. The results, reproduced in Table X showed considerably greater increases in carrying capacity among the "balanced pastures" group. However the superphosphate use of the latter group was markedly higher so that the increase in carrying capacity could not be attributed to the botanical composition of the pasture. An alternative approach tried was to compare the "balanced pastures group" with the "maximum fertiliser group" (i.e. of Table IX), after deducting from the second group those correspondents (five in number) who had balanced pastures and used more than 100 lb. of superphosphate. The comparison, also given in Table X, shows—contrary to expectations—that the new "maximum fertiliser group" obtains a greater increase in carrying capacity than the balanced pasture group despite the latter's greater average use of fertiliser.

TABLE X

Average Carrying Capacities for Various Groups of Wheat-sheep Farmers

(Dry Sheep Equivalents)

	"Balanced Pastures" Group	All Other Farmers	Other Farmers who Use more than 100 lb. of Superphosphate
Natural Pastures	1·4	1·2	1·4
Improved Pastures—			
First Year after Sowing	1·8	1·4	2·1
Second Year after Sowing	2·9	2·3	3·1
Third Year after Sowing	3·4	2·7	3·7
Fourth Year after Sowing	3·7	3·1	4·1
Average Fertiliser Application ...	131 lb.	76 lb.	116 lb.
Number of Farmers	10	61	15

The number of observations in the balanced pasture group is of course, very small. Another factor is that the classification of balanced pasture or otherwise on the basis of the answers in the mail questionnaire is considerably more arbitrary than the classification according to superphosphate use or original carrying capacity.

While the tests for consistency are therefore not as satisfactory as one would like, the results do suggest that the correspondents' estimates of carrying capacity are reasonably consistent and probably as reliable

as any other available evidence of the gains to be obtained from pasture improvement under farming conditions in the wheat areas of New South Wales.[11]

Only 31 of the correspondents attempted to estimate the increase in wheat yields which they obtained from putting land under improved pastures for a period of years. In many cases land sown to improved pastures has not been cropped since. There was a wide range of estimates of the resulting increase. Two correspondents estimated the increase at less than 5 bushels, 17 estimates ranged from 5 to 9 bushels; five estimates were between 10 and 14 bushels and seven correspondents put the increase at 15 bushels or more. Most of the farmers in the last group suggested that on country which had not been sown to clovers, skeleton weed reduced wheat yields substantially—in many cases to uneconomic levels.

A classification of estimated increases in wheat yields according to the length of the pasture phase is given in Table XI.

TABLE XI

Estimated Increase in Wheat Yields

Number of Years	Number of Farmers	Average Estimated Increase in Wheat Yields (Bushels per Acre)
3–4	8	7·3
5–6	15	10·6
7 or more	8	10·2
	31	9·6

APPENDIX II

The Effects of Taxation

Taxation makes development programmes such as pasture improvement less profitable than they would have been in the absence of a tax liability. This is the result of two factors: Firstly, in most improvement programmes the total income attributable to improvements will exceed costs—hence a flat-rate of tax on income would increase the total tax liability of the farmer (over the whole life of the developmental project). In addition, under a progressive system of taxation the gains in income obtained in the later years of development will be taxed at a heavier rate than the savings in tax obtained in the earlier years when developmental expenditure reduces taxable income.

[11] In the financial calculations in the earlier section the following stocking rates (in dry sheep equivalents) were used: Natural Pastures: 1.2; Improved Pastures: First Year after sowing: 1.3; Second Year: 1.8; Third Year: 2.4; Fourth Year: 2.7.

To obtain a more concrete idea of the effects of taxation on the profitability of a pasture improvement programme the changing tax liability in different years is given in Table XII. The figures given relate to the third pasture improvement programme discussed in the text, namely, the sowing of 100 acres of pasture annually (on a 900-acre wheat-sheep farm). To construct this table certain assumptions regarding tax rates and taxable income had to be made. These were:—

(1) Prices and costs during the entire pasture improvement period are those used earlier in the text.

(2) Taxes payable are based on 1955-56 income tax rates.

(3) Two schedules of tax liability were worked based on two values of taxable income prior to the pasture improvement programme. Taxable income depends on net income from the farm (ignoring the possibility of outside sources of income) and the personal deductions (e.g., dependants, medical expenses, insurance) allowable in each case. As mentioned earlier, the net income on a 900-acre wheat-sheep farm, under the price and cost figures given will range from £1,500 to £2,000 a year. To obtain the likely range of taxable incomes, personal deductions of £400 were allowed at the lowest likely net income and £200 at the top income, giving two taxable incomes (£1,100 and £1,800 respectively). It is believed that most farmers on an unimproved 900-acre farm of the type specified would fall within these limits of taxable income (at 1955-56 prices and costs).

Expenses incurred in the course of the pasture improvement programme outlined earlier are deductible for tax purposes. The only exceptions are the purchase of *extra* ewes and rams, which are capital items. Replacements of ewes and rams are deductible. (It is assumed that uniform livestock valuations, over time, are used in the preparation of tax returns.) To obtain the taxable income in any single year the figure given under "Annual Cash Position" (Table V) is added to the basic taxable income (£1,100 or £1,800) and an adustment is made for the extra ewes and rams purchased in that year (see columns 4 and 8, Table XV, Appendix III).[12]

As shown in Table XII, the savings in tax made in the earlier years are comparatively small when compared with the extra taxes payable when the additional investment increases taxable income. Total savings in taxation in the improvement programme given are between £198 and £285, depending on the previous level of taxable income. The total net increase in costs resulting from pasture improvement is £2,877.[13] Given present rates of income tax and the likely range of incomes, taxation will therefore reduce the effective cost of this particular pasture improvement programme by approximately 7 to 10 per cent.

[12] For instance, in year 5, taking the basic taxable income as £1,100, the extra expenses of pasture improvement were £740, leaving £360. To this must be added the cost of purchasing 83 extra ewes (£415) and two rams (£60), which are not deductible, giving a new taxable income of £835.

[13] This is the sum of "Annual Cash Position" over the first seven years. This differs from the level of the overdraft at the end of the seventh year, as no allowance has been made for interest due annually.

On the other hand, the financial gain from pasture improvement is reduced more substantially. For instance, the long-term gain of £1,650 per annum (i.e., after allowing for increased annual costs of fencing and water supplies) is reduced to a net annual gain after taxes of £1,016 or £1,124 respectively.

There are a number of ways of reducing this tax liability substantially. One would be to convert the income gain into a capital gain by improving a property and then selling it and repeating this process. Another method frequently used is to convert the farm business into a family partnership so that individual incomes are reduced. However, it is beyond the scope of this note to work out in detail the financial implications of such a change.

TABLE XII

*Tax Liability Under One Pasture Improvement Programme**

Year	Lower Limit				Upper Limit			
	Taxable Income	Tax Payable	Tax Saved	Extra Tax Payable	Taxable Income	Tax Payable	Tax Saved	Extra Tax Payable
	£	£	£	£	£	£	£	£
Prior to Pasture Improvement ...	1,100	128	...	...	1,800	312	...	...
1	1,037	114	14	...	1,737	293	19	...
2	936	94	34	...	1,636	264	48	...
3	861	80	48	...	1,561	242	70	...
4	909	89	39	...	1,609	256	56	...
5	835	76	52	...	1,535	235	77	...
6	1,051	117	11	...	1,751	297	15	...
7	1,239	159	...	31	1,939	357	...	45
8	1,540	237	...	108	2,240	461	...	149
9	1,990	373	...	245	2,690	629	...	317
10	2,818	679	...	551	3,518	975	...	663
11	2,901	713	...	585	3,601	1,012	...	700
12	2,812	676	...	548	3,512	972	...	660
"Long Term †" ...	2,750	652	...	524	3,450	946	...	634

* The provisions allowing for averaging of incomes have not been taken into account in the calculation of tax liability.

† Additional income taken as £1,650 a year—i.e., average annual cost of additional fencing and water supplies are allowed for.

APPENDIX III

Detailed Financial Tables

TABLE XIII

Annual Returns and Expenses—900 Acre Wheat-sheep Farm

(Sowing 300 Acres of Pasture a Year for Three Years)

Financial Year	Change in Expenses									Change in Income				Net Effect on Cash Position	Extra Ewes Run at End of Year
	Seed*	Super-phosphate†	Extra Ewes‡	Ewe Replacements‡	Shearing§	Crutching and Chemicals‖	Extra Rams¶	Ram Replacements¶	Increased Sheep Losses**	Wheat††	Wool	Fat Lambs	Sale of Old Ewes‡‡		
	£	£	£	£	£	£	£	£	£	£	£	£	£	£	
1	— 187	...	...	...	...	...	...	...	...	...	...	...	...	— 187	...
2	— 187	— 300	— 125	...	...	— 5	...	...	— 3	...	...	...	...	— 620	25
3	— 187	— 600	— 500	...	— 5	— 25	— 60	...	— 18	...	+ 50	+ 76	...	—1,269	125
4	...	— 900	—1,000	...	— 25	— 65	— 120	...	— 48	...	+ 250	+ 376	...	—1,532	325
5	...	— 900	—1,125	...	— 65	— 110	— 150	...	— 81	— 795	+ 650§§	+ 976§§	...	—1,600	550
6	...	— 900	— 750	— 125	— 110	— 140	— 90	— 60	— 105	— 795	+1,180§§	+1,725§§	+ 50	— 120	700
7	...	— 800	...	— 500	— 140	— 140	...	— 120	— 105	— 795	+1,560	+ 2,250	+ 200	+1,410	700
8	— 63	— 700	...	— 500	— 140	— 120	...	— 90	— 90	— 235	+1,560	+ 2,250	+ 400	+ 2,272	600
9	— 62	— 600	...	— 875	— 120	— 110	...	— 120	— 84	+ 185	+1,360	+1,950	+ 450	+1,974	550
10	— 63	— 600	...	— 875	— 110	— 110	...	— 120	— 81	+ 185	+1,260	+1,800	+ 350	+1,636	550
11	— 62	— 600	...	— 500	— 110	— 110	...	— 90	— 84	+ 185	+1,260	+1,800	+ 200	+1,889	550

* At the rate of 12s. 6d. per acre.
† At the rate of £1 per acre.
‡ At the rate of £5 each.
§ At the rate of £20 per 100 sheep shorn (number of sheep taken from number of ewes at end of *previous* financial year).
‖ At the rate of £20 per 100 sheep (number of sheep taken from number of ewes at end of each financial year).
¶ At the rate of £30 each (2 per cent rams).
** 5 per cent of sheep numbers at the end of the year—replaced at cost of £3 each.
†† Net change in income after taking account of cash expenses of growing and harvesting (82s. od. per acre).
‡‡ At the rate of £2 each.
§§ Increased cut per ewe and increased value per lamb marketed for sheep previously run on natural pasture assumed from the fifth year onwards.

TABLE XIV

Annual Returns and Expenses—900 Acre Wheat-sheep Farm

(Sowing 150 Acres of Pasture a Year for Six Years)

Financial Year	Change in Expenses									Change in Income				Net Effect on Cash Position	Extra Ewes Run at End of Year
	Seed*	Super-phos-phate†	Extra Ewes‡	Ewe Replace-ments‡	Shearing§	Crutching and Chem-icals‖	Extra Rams¶	Ram Replace-ments¶	Increased Sheep Losses**	Wheat††	Wool	Fat Lambs	Sale of Old Ewes‡‡		
	£	£	£	£	£	£	£	£	£	£	£	£	£	£	
1	— 94	...	...	...	...	...	...	...	...	...	...	...	...	— 94	...
2	— 93	— 150	— 60	...	...	— 2	...	...	...	...	...	...	...	— 305	12
3	— 94	— 300	— 250	...	— 2	— 12	— 30	...	— 9	...	+ 24	+ 36	...	— 637	62
4	— 93	— 450	— 500	...	— 12	— 32	— 60	...	— 24	...	+ 125	+ 188	...	— 858	162
5	— 94	— 600	— 625	...	— 32	— 57	— 90	...	— 42	— 397	+ 324	+ 484	...	— 1,129	287
6	— 93	— 750	— 625	— 60	— 57	— 82	— 60	— 30	— 63	— 397	+ 574	+ 860	+ 24	— 759	412
7	— 63	— 700	— 625	— 250	— 82	— 107	— 90	— 60	— 81	— 397	+ 904§§	+ 1,311§§	+ 100	— 140	537
8	— 62	— 600	— 65	— 500	— 107	— 110	...	— 90	— 84	— 335	+ 1,234	+ 1,762	+ 200	+ 1,243	550
9	— 63	— 600	...	— 625	— 110	— 110	...	— 90	— 81	+ 185	+ 1,260	+ 1,800	+ 250	+ 1,816	550
10	— 62	— 600	...	— 685	— 110	— 110	...	— 150	— 84	+ 185	+ 1,260	+ 1,800	+ 274	+ 1,718	550
11	— 63	— 600	...	— 875	— 110	— 110	...	— 90	— 81	+ 185	+ 1,260	+ 1,800	+ 350	+ 1,666	550

* At the rate of 12s. 6d. per acre.
† At the rate of £1 per acre.
‡ At the rate of £5 each.
§ At the rate of £20 per 100 sheep shorn (number of sheep taken from number of ewes at end of previous financial year).
‖ At the rate of £20 per 100 sheep (number of sheep taken from number of ewes at end of each financial year).
¶ At the rate of £30 each (2 per cent rams).
** 5 per cent of sheep numbers at the end of the year—replaced at cost of £3 each.
†† Net change in income after taking account of cash expenses of growing and harvesting (82s. 0d. per acre).
‡‡ At the rate of £2 each.
§§ Increased cut per ewe and increased value per lamb marketed for sheep previously run on natural pasture assumed from the seventh year onwards.

TABLE XV

Annual Returns and Expenses—900 Acre Wheat-sheep Farm

(Sowing 100 Acres of Pasture a Year Continuously)

Financial Year	Change in Expenses									Change in Income				Net Effect on Cash Position	Extra Ewes Run at End of Year
	Seed*	Super-phosphate†	Extra Ewes‡	Ewe Replacements‡	Shearing§	Crutching and Chemicals‖	Extra Rams¶	Ram Replacements¶	Increased Sheep Losses**	Wheat††	Wool	Fat Lambs	Sale of Old Ewes‡‡		
	£	£	£	£	£	£	£	£	£	£	£	£	£	£	
1	— 63	...	...	...	...	...	...	...	...	...	...	...	...	— 63	...
2	— 62	— 100	— 40	...	...	— 2	...	...	...	...	...	...	...	— 204	8
3	— 63	— 200	— 180	...	— 1	— 9	— 30	...	— 6	...	+ 16	+ 24	...	— 449	44
4	— 62	— 300	— 335	...	— 9	— 22	— 30	...	— 18	...	+ 88	+ 132	...	— 556	111
5	— 63	— 400	— 415	...	— 22	— 39	— 60	...	— 30	— 265	+ 222	+ 332	...	— 740	194
6	— 62	— 500	— 415	— 40	— 39	— 55	— 60	— 30	— 42	— 265	+ 388	+ 580	+ 16	— 524	277
7	— 63	— 600	— 415	— 180	— 55	— 72	— 30	— 30	— 54	— 265	+ 554	+ 832	+ 72	— 306	360
8	— 62	— 700	— 415	— 335	— 72	— 89	— 60	— 60	— 66	— 265	+ 800§§	+ 1,155§§	+ 134	— 35	443
9	— 63	— 700	— 375	— 415	— 89	— 104	— 30	— 90	— 78	— 265	+ 1,046	+ 1,482	+ 166	+ 485	518
10	— 62	— 600	— 160	— 455	— 104	— 110	— 30	— 60	— 81	+ 110	+ 1,196	+ 1,702	+ 182	+ 1,528	550
11	— 63	— 600	...	— 595	— 110	— 110	...	— 120	— 84	+ 185	+ 1,260	+ 1,800	+ 238	+ 1,801	550
12	— 62	— 600	...	— 750	— 110	— 110	...	— 120	— 81	+ 185	+ 1,260	+ 1,800	+ 300	+ 1,712	550

* At the rate of 12s. 6d. per acre.
† At the rate of £1 per acre.
‡ At the rate of £5 each.
§ At the rate of £20 per 100 sheep shorn (number of sheep taken from number of ewes at end of previous financial year).
‖ At the rate of £20 per 100 sheep (number of sheep taken from number of ewes at end of each financial year).
¶ At the rate of £30 each (2 per cent rams).
** 5 per cent of sheep numbers at the end of the year—replaced at cost of £3 each.
†† Net change in income after taking account of cash expenses of growing and harvesting (82s. 0d. per acre).
‡‡ At the rate of £2 each.
§§ Increased cut per ewe and increased value per lamb marketed for sheep previously run on natural pasture assumed from the eighth year onwards.

TABLE XVI

Annual Returns and Expenses—900 Acre Wheat-sheep Farm

(100 Acres a Year for the First Three Years)

Financial Year	Change in Expenses									Change in Income				Net Effect on Cash Position	Extra Ewes Run at End of Year
	Seed*	Super-phos-phate †	Extra Ewes ‡	Ewe Replace-ments‡	Shearing Costs§	Crutching and Chem-icals‖	Extra Rams ¶	Ram Replace-ments¶	Increased Sheep Losses**	Wheat††	Wool	Fat Lambs	Sale of Old Ewes‡‡		
	£	£	£	£	£	£	£	£	£	£	£	£	£	£	
1	— 63	...	...	...	...	...	...	...	...	...	...	...	...	— 63	...
2	— 62	— 100	— 40	...	...	— 2	...	...	...	...	...	...	...	— 204	8
3	— 63	— 200	— 180	...	— 1	— 9	— 30	...	— 6	...	+ 16	+ 24	...	— 449	44
4	...	— 300	— 335	...	— 9	— 22	— 30	...	— 18	...	+ 88	+ 132	...	— 494	111
5	...	— 300	— 375	...	— 22	— 37	— 60	...	— 27	— 265	+ 222	+ 332	...	— 532	186
6	...	— 300	— 250	— 40	— 37	— 47	— 30	— 30	— 36	— 265	+ 372	+ 560	+ 16	— 87	236
7	...	— 300	— 80	— 180	— 47	— 50	...	— 30	— 36	— 265	+ 472	+ 708	+ 72	+ 264	250
8	...	— 300	...	— 335	— 50	— 50	...	— 60	— 39	— 265	+ 500	+ 748	+ 134	+ 283	250
9	— 62	— 200	...	— 125	— 50	— 40	...	— 30	— 30	+ 450	+ 500	+ 748	+ 150	+ 1,311	200
10	— 63	— 200	...	— 290	— 40	— 40	...	— 30	— 30	+ 450	+ 400	+ 600	+ 116	+ 873	200
11	— 62	— 200	...	— 260	— 40	— 40	...	— 60	— 30	+ 450	+ 400	+ 600	+ 104	+ 862	200

* At the rate of 12s. 6d. per acre.
† At the rate of £1 per acre.
‡ At the rate of £5 each.
§ At the rate of £20 per 100 sheep shorn (number of sheep taken from number of ewes at end of previous financial year).
‖ At the rate of £20 per 100 sheep (number of sheep taken from number of ewes at end of each financial year).
¶ At the rate of £30 each (2 per cent rams).
** 5 per cent of sheep numbers at the end of the year—replaced at cost of £3 each.
†† Net change in income after taking account of cash expenses of growing and harvesting (82s. 0d. per acre).
‡‡ At the rate of £2 each.