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TWO CASE STUDIES OF PASTURE IMPROVEMENT IN A COST-PRICE SQUEEZE

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Adverse trends in lamb and wool prices and the costs of most purchased inputs have submitted sheep owners to an increasing cost-price squeeze over the latter part of the last decade. This phenomenon has been the cause of concerned comment by industry leaders and has undoubtedly led to extremely low average returns to capital and severe hardship in some sectors of the sheep industry in Australia.¹ It seems important to know how farmers investing in pasture improvement have fared in these circumstances.

There is reason to believe that the decline in wool prices has varied in the severity of its effect on different landowners. One unfortunate sector of the community who purchased stock or property at high prices on the basis of favourable expectations formed in the good years of the early 'fifties is undoubtedly badly placed to withstand a reduction in income. Another substantial sector of the industry has been severely hampered in recent years in its plans for expansion of production. Advances in knowledge of pasture improvement and associated methods of property development dating more or less from World War II have made such expansion technically feasible, but in the more climatically favoured areas aggregate capital required to fully implement the improvements suggested by research to date is very great.²

The conditions of a cost-price squeeze create difficulties in property development on any substantial scale. Not only do they tend to reduce the landholder's surplus of current income over expenses and hence curtail this customary supply of funds for investment, they also tend to weaken confidence in the industry and thus foster more severe capital rationing, both internal and external to the firm. Two effects of such capital rationing appear to be of significance in the New England district of New South Wales; on the one hand, it tends to induce an exaggerated impression of the severity of any cost-price squeeze in the mind of the individual land-

¹ See, for example, C. D'A. Chislett, *A Review of Factors Influencing Production in the Sheep and Wool Industry* (Sydney: Graziers' Federal Council, March, 1960).

² See, for instance, N. Crew, "Pastoral Development in New England", *Proceedings Australian Institute of Agricultural Science, N.S.W., Northern Sub-Branch Symposium* (Armidale, August, 1960). (Mimeo.) Some 3.3 million sheep graze on the New England Tableland proper. Within this area over two million acres is suitable for pasture improvement, of which less than 25 per cent is at present improved by seeding with introduced pasture species and/or topdressing with superphosphate. On the basis of current results this acreage should be possible of development to carry an extra sheep per acre on the unimproved sector representing approximately 1.6 million additional sheep. Crew estimates that approximately £6 million would be required for the initial topdressing and seeding of this area and the additional investment in sheep and ancillary improvements would raise the total investment required to a figure of the order of £10 million at present prices.

holder while, on the other, it may result in average gross (and net) rates of return to capital invested in the new techniques falling short of those technically feasible.

It is apparently inevitable that the sheepowner pursuing a policy of progressively improving his pastures will be faced with the need to find increasing sums of money for several years to finance the purchase of stock and other incidental expenses. During this period the increase in expenditure is very likely to be greater than any increase in income. It may be that he will receive relatively low or negative rates of return on his investment until his pasture improvement programme reaches some critical stage. Where the operator of a partially improved property is overtaken by a cost-price squeeze—especially if the property is so small as to leave a very limited surplus of revenue over current outgoings at the new prices—not only may development be arrested, but he could conceivably lose part or all of the previous gains towards his ultimate goal, through the need to skimp on follow-up fertilizer applications and similar expenditure.

Evaluating Vulnerability to Price Decline

In New England and the surrounding areas to the south and west there is considerable technical potential for property development through pasture improvement. The adoption of such practices requires the purchase of additional “off-farm” services such as fertilizer and machinery, the relative price of which would normally be expected to move in sympathy with the general non-agricultural price level. On the other hand, the introduction of improved pasture frequently permits a reduction in some items of off-farm expenditure—particularly the purchase of replacement stock in New England—whose prices might be expected to decline somewhat with a general fall in the value of sheep products. An important question is whether the sum total of such changes in the proportion and value of purchased inputs, and changes in gross income, will render the operator of a pasture-improved property more or less “vulnerable” to any cost-price squeeze.³ Following Gruen⁴ the ratio:

Cost of Purchase Inputs⁵

Gross Revenue

has been used as a measure of “vulnerability”. The closer the ratio approaches unity from zero the more “vulnerable” in a given situation is the landholder. It will be apparent that if the ratio:

Cost of Purchased Inputs

Gross Value of Outputs

is equal to one-half, for example, a 5 per cent fall in product prices will

³ For a discussion of different categories of economic “vulnerability”, see W. H. Brown, “Are Farmers More Vulnerable to the Price-cost Squeeze”, *Journal of Farm Economics*, Vol. XLI, No. 3 (August, 1959), p. 558.

⁴ F. H. Gruen, “Economic Aspects of Pasture Production in the Australian Wool Industry”, *Economic Record*, Vol. XXVI, No. 74 (April, 1960), p. 220, Appendix I (b) and (c).

⁵ It should be noted that depreciation has been included among “purchased” inputs, although it does not necessarily entail short-run cash outlay.

have the same effect on net disposal revenue as a 10 per cent rise in aggregate costs. The higher the ratio the greater the percentage fall in income following a price decline, while should the ratio exceed unity, costs per unit of output exceed revenue, i.e., the business is running at a loss.

It will be apparent that the closer this "vulnerability" ratio approaches unity the greater the expected variance in net income for a given percentage change in the prices of products or services. Individuals might be expected to differ in their preference for high or low "vulnerability" depending on their personal Expected Income—Income Variance indifference schedule and their levels of gross and net income. At a given level of income a low "vulnerability" should surely be preferred to a high by a majority of operators, but there is probably no rule for deciding *a priori* how an individual would choose between a high income—highly "vulnerable" situation and a lower income—less vulnerable situation. The tenor of recent comments by industry leaders does suggest that the opinion is quite commonly held that present expectations regarding costs, prices and the likelihood of advantageous technical innovation in the sheep industry in the immediate future predispose graziers to favour situations where vulnerability is reduced.

If changes in "vulnerability" and income at current prices are depicted on rectangular co-ordinates as in Figure 1, it might be expected that there would exist for each individual an iso-indifference curve of some such shape as 11'. At a given level of income represented by O the individual might be prepared to exchange greater/ less income for less/greater "vulnerability" and to be indifferent to any combination along 11'. Any combination above 11' in Figure 1 would be less preferable than O while any combination below 11' would be preferable to any along the curve 101'.

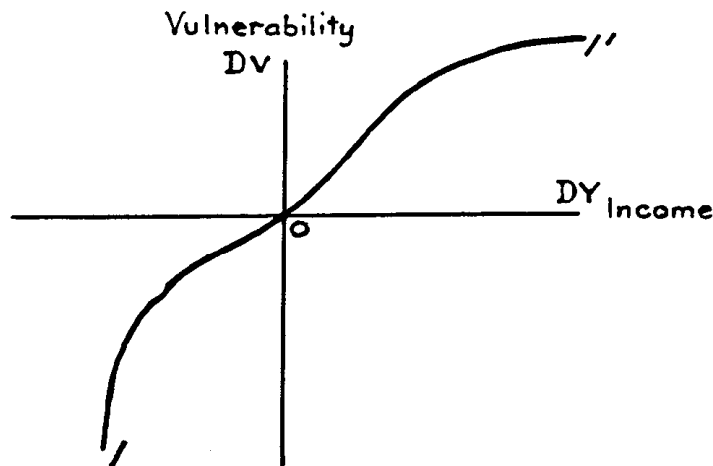


Fig. 1

The vice which administers the cost-price squeeze has two jaws—costs and prices. Strictly speaking, both can move but the approach adopted in the two case studies reported has been to alter livestock replacement costs and product prices only. The prices of some purchased inputs other than livestock replacements may be influenced by product prices—for example, shire rates or commissions could be in the long run. But it is believed that in the present examples little would be gained from an endeavour to guess the magnitude of changes in these components of total cost and their assessment would unduly complicate consideration of the effects of the squeeze however applied.

In this relatively simple study the situations which have been compared are the organization of each of two properties before and after pasture improvement; in each case at the prices ruling in 1959-60. Detailed budgets were prepared for each situation. Parametric budget equations were prepared for each farm situation by grouping those items of income and expenditure which could be expected to vary as (assumed linear) functions of wool, lamb and cattle prices.

The Properties Studied

PROPERTY A

Property A is situated slightly north-east of Armidale and comprises 1,480 acres of undulating to hilly land. The annual rainfall is approximately 30". Large areas are covered with dead timber. When acquired in 1948 the property carried considerable green timber regrowth and a heavy rabbit population. There was no improved pasture. By 1950 three hundred acres of sown pastures were established, but the owner subsequently saw little improvement in production as a result.

With the advent of myxomatosis and sustained effort by the owner in repairing fences and in timber treatment, the twin problems of rabbit infestation and heavy (timber) regrowth were substantially solved by 1955 but the owner could secure no additional credit nor could he see any real opportunities for continued development from savings from his relatively low income.

In 1958 additional loans totalling just under £13,500 were negotiated. These permitted aerial topdressing of the entire 1,480 acres with superphosphate at 1½ cwt. per acre with, in addition, 1½ lb. per acre of white clover seed on those areas not previously sown down. An additional 1,800 ewes and extra cattle were purchased in 1958-59 more than doubling the 1957-58 stocking rate and a further 1 cwt. per acre of superphosphate was applied by air to the entire property. Sufficient funds remained for a further dressing of superphosphate in the spring of 1960. In 1960-61 the owner plans to retain about 600 additional ewes from natural increase and to raise cattle numbers to the customary 3-4 per cent of sheep carried. He feels confident that he will, before long, reach a carrying capacity of three breeding ewes per acre.

Nineteen fifty-eight was a dry year in the Armidale district; wetter seasons would be expected in approximately seven years out of eight. At least four abortive germinations occurred in the white clover seedings following isolated showers but establishment was secured at the end of the year. As late as July, 1960, distinct "stripes" of clover could be seen across all the hills where the seed had fallen thickest in each pass of the aircraft but the clover is spreading well over the intervening areas. The owner of farm A has been quite fortunate, it would seem, in the establishment secured, but as far as can be determined the work was undertaken under climatic conditions as adverse as one could ordinarily expect to encounter. It is apparent, of course, that his own considerable efforts, coupled with the successful negotiation of the loan of £13,500 had placed him in the position to profit immediately from the good fortune that came his way.

The impact of pasture improvement, first on 300 acres between 1948-50, and subsequently on the remaining 1,180 acres in 1958, can be seen from Tables 1, 2 and 3 which are summarized budgets based on 1958-60 prices and on farm organization in the first year after acquisition (1948-49), in 1957-58, and 1959-60 respectively. Table 4 and Appendices I and II provide more detailed comparisons. As total capital investment increased from £40,000 in 1948-49, through £47,000 in 1957-58 to £58,000 in 1959-60, the corresponding net revenues at 1959-60 prices were £1,408, £2,807 and £12,148.⁹

TABLE 1

*Budget for Property A as Organized in 1948-49
At 1959-60 Costs and Prices*

Revenue		Expenses	
	£		£
Wool, 1,250 x 7 lb. @ 70d. ..	2,552	Shearing, Crutching, Dren-	
Fat Lambs 200 @ 75s. ..	750	ching, Dipping, Vet, Jetting	
C.f.a. Sheep 110 @ £1 ..	110	Expenses	626
Yearling Steers 12 @ £33 ..	396	Repairs, Maintenance, Rates,	
		Fuel, Services, etc. ..	1,251
		Depreciation	372
		Wool Marketing Charges ..	151
		Total Expenses	2,400
		Net Revenue	1,408
Gross Revenue	3,808	Total	3,808

⁹The individual figures for 1959-60 have been checked against the books of account used in preparing the 1959-60 return of income for taxation purposes; the valuations were checked against the assessments made by a licensed valuer. Interest on borrowed capital has not been deducted from income.

The physical budgets from which Tables 1 and 2 were prepared do not coincide exactly with the results for any one year but give a fair picture of farm organization at the two earlier levels of development.

TABLE 2

*Budget for Property A as Organized 1955-58
At 1959-60 Prices*

Revenue		Expenses	
	£		£
Wool, 1,590 x 8½ lb. @ 70d. ..	3,902	Sheep Expenses	556
Fat Lambs 270 @ 75s. ..	1,013	Repairs, Rates, Fuel, Services, etc.	1,395
C.f.a. Sheep 175 @ £1 ..	175	Depreciation	384
Yearling Steers 12 @ £34 ..	408	Fertilizer	135
		Wool Marketing Costs ..	221
		Total Expenses	2,691
		Net Revenue	2,807
Gross Revenue	5,498	Total	5,498

TABLE 3

*Budget for Property A as Organized in 1959-60
At 1959-60 Prices*

Revenue		Expenses	
	£		£
Wool, 2,900 x 11·8 lb. @ 70d. ..	9,981	Sheep Expenses	1,608
Fat Lambs 1,860 x 71s. ..	6,603	Labour	998
Fat Culls and C.f.a. 589 @ £2* ..	1,178	Repairs, Rates, Fuel, Services, etc.	1,966
Vealers 40 x £37	1,480	Depreciation	560
		Fertilizers	1,332
		Wool Marketing Charges ..	630
		Total Expenditure	7,094
		Net Revenue	12,148
Gross Revenue	19,242	Total	19,242

* Culls and c.f.a. sheep are now being turned off in fat condition, lambs are sold at 4-5 months instead of 14 months as from 1948 to 1957.

Table 4 summarizes some of the physical and financial results of the three development situations. This table suggests that although vulnerability to a cost-price squeeze was reduced in the 1951-57 period with 300 acres of surface seeded pasture there was a pronounced increase in the rate of gross return to pasture improvement (and an even greater increase in the rate of net return) as an increasing proportion of the property was developed.

TABLE 4
Comparisons for Farm A Before and After

Item	Unit	Situation		
		Original	1957-58	1960
WOOL PRODUCTION—				
Clip per head	lb.	7.0	8.25	11.8
Total Clip	lb.	8,750	13,118	34,220
Increase from Previous Situation	lb.	..	4,368	21,102
Yield/Acre	lb.	5.91	8.86	23.26
Increase per Improved Acre	lb.	..	14.54	17.21
Increase per Acre, Final 1,180 Acres	lb.	..	..	17.89
FAT LAMBS—				
Total Sold	No.	200	270	1,860
Production per Acre	No.	0.14	0.18	1.26
Additional per Acre Improved	No.	..	0.23	1.12
Increase per Acre Final 1,180 Acres	No.	..	..	1.35
Lambing Percentage	Per cent	65	70	95
SHEEP NUMBERS—				
"Sheep" Carried* per Acre	No.	0.85	1.07	2.36
Addition, per Acre Improved	No.	..	1.13	1.52
Added by each of Final 1,180 Acres	No.	..	..	1.62
CAPITAL AND REVENUE CHANGES—				
Approximate Total Capital Employed	£	40,000	47,000	58,000
Increase from First Situation	£	..	7,000	18,000
Gross Revenue Increase from 1948	£	..	1,690	15,434
As percentage of Additional Capital since 1948	Per cent	..	24	86
Percentage Return on Increment of Investment after 1958	Per cent	..	..	125
Net Revenue Increase	£	..	1,399	10,740
As Percentage of Investment after 1948	Per cent	..	20	60
Net Return on Post-1958 Investment	Per cent	..	..	85
Cash Expenditure—"Vulnerability" Gross Income	Ratio	0.630	0.489	0.369

* Majority of lambs now sold at 4-5 months, previously at 13-14 months. 600 sheep have been added to existing mature sheep numbers. This number could represent demands of the 1,680 lambs or the additional young ewes to be carried in future.

It seems likely that physical vulnerability to adverse seasons has been reduced. In both 1953 and 1956 sheep were sent away on agistment whereas currently the property appears to be leniently stocked. Ewes now lamb as two-year-olds instead of three-year-olds as in the past and wool

cut per head has risen by over 3 lb. despite the increase in number shorn. Lambs are now turned off at an average age of 4-5 months instead of 13-14 months as previously, and half the lambs dropped are now crossbreds because higher lambing (95 per cent as against 70 per cent) and survival rates have made maintenance of flock numbers quite simple. Increased numbers of cattle are being sold as vealers.

It might be thought that some of the response of pastures in the last two years is a delayed effect from work done earlier. Against this it must be noted that the management plan was more or less static for some years after 1951-52 and the change in the composition of aerially topdressed pasture, treated in 1958, is most pronounced.

It is notable that the plant and buildings on the property, although quite serviceable, are valued well below those on many comparable properties. This reflects purposive careful selection of equipment, frequently purchased in good used condition.

PROPERTY B

This property is situated in the Quirindi district on the North-western Slope and comprises an area of 2,500 acres of undulating land. The area cleared for cultivation is approximately 1,000 acres; the remainder is lightly timbered. The soil is a heavy black clay and average rainfall is approximately 26" per annum.

Before pasture improvement was commenced the property was carrying 1,600 ewes cutting an average of 9 lb. of wool and approximately 1,280 fat lambs and 10 vealers were sold each year. (The breeding cow replacements were purchased as required.) In addition 300 acres of wheat were sown yielding an average of 30 bushels per acre.

The pasture improvement programme was commenced in 1951 and has been financed from revenue. The system of development has been to sow the pastures—predominantly lucerne, phalaris, rye grass, cocksfoot plus a small area of strawberry clover—with a wheat cover crop. At the present time there are 900 acres of improved pastures.

Since pasture improvement commenced two hay sheds, two miles of fencing and increased watering points have been constructed, and the aim has been to increase stock numbers at the rate of 200 sheep per year. This figure has not been maintained throughout development, as the owner was away from the property for part of the period. Labour requirements have remained unchanged following pasture improvement. Superphosphate is spread from the air on 900 acres each year at the rate of 1 cwt. per acre, the whole property being treated more or less in rotation.

With 900 acres of sown pasture the property is now carrying 2,500 ewes which yield 10.5 lb. of wool per head. Fat lamb sales approximate 2,300 while 90 vealers are sold each year. Wheat is no longer sown; however, a yearly return of 50 bags of lucerne seed is produced. Fodder reserves consist at present of 8,000 bales of hay and 1,500 bushels of oats. These reserves are being accumulated as the seasons permit.

TABLE 5

*Budget for Farm B as Organized before 1950
At 1959-60 Costs and Prices*

Revenue		Expenses	
	£		£
Wool, 1,600 Ewes x 9 lb. @ 66d.,		Flock Maintenance 400 @ 95s.	1,900
30 Rams x 11 lb. @ 54d. ..	4,034	Shearing, Crutching, etc. ..	537
Fat Lambs 1,280 x 70s. ..	4,480	Cattle 4 Cows @ £45 ..	180
C.f.a. Sheep 242 @ 25s. ..	303	Labour, 2 Permanent + Casual	1,650
Vealers 10 @ £30 ..	300	Repairs, Maintenance ..	350
Wheat, 9,000 bushels @ 9s. ..	4,050	Shire and P. P. Rates ..	234
		Fuel	304
		Other (estimate)	900
		<i>Depreciation—</i>	
		Buildings £3,000 .. £ 75	
		Machinery £5,700 .. £570	
			645
		Wool Marketing Expenses ..	207
		Total Expenses	6,907
		Net Revenue	6,260
Gross Revenue	13,167		13,167

TABLE 6

*Budget for Farm B as Organized in 1959-60
At 1959-60 Prices*

Revenue		Expenses	
	£		£
Wool, 2,500 Ewes x 10.5 lb. @		Stock Maintenance 500 @ 95s.	2,375
66d. lb., 40 Rams x 9.0 lb. @		Shearing, Crutching, etc. ..	817
54d. lb.	7,300	Labour, 2 Permanent + Casual	1,929
Fat Lambs 2,300 @ 70s. ..	8,050	Repairs, Maintenance ..	450
C.f.a. Sheep 336 @ 25s. ..	420	Rates	260
Culls 88 @ 45s.	198	Fuel	304
Vealers 90 @ £30	2,700	Other (estimate)	1,300
Seed Lucerne 50 bags @ £30 ..	1,500	Fertilizer	776
		<i>Depreciation—</i>	
		Machinery £5,400 .. £540	
		Buildings £3,600 .. £ 90	
			630
		Wool Selling Expenses ..	405
		Total Expenses	9,246
		Net Revenue	10,922
Gross Revenue	20,168		20,168

“Before” and “After” budgets are presented for Farm B in Tables 5 and 6. It will be apparent that disposal income at current costs and prices is higher under the new method of organization and that vulnerability to a cost-price squeeze has been significantly reduced. A summary of the results (at 1959-60 prices) of increasing capital investment from approximately £69,000 in 1950 to £85,000 in 1960, is provided in Table 7. Gross revenue increased by £3,068 from wool sales, £3,410 from sales of lambs, c.f.a. and cull sheep, and £2,580 from increased numbers of cattle sold. Sales of seed and grain declined by £2,550, so that the total increase in revenue was approximately £7,000. Net revenue increased from £6,260 to £10,922, an added return of £4,662 or 29.1 per cent to the additional investment of £16,000 made over the ten-year period. It would seem that gross and net revenue could be considerably increased by further investment and that development could have been more rapid if the rate of investment over the last nine years had been higher. The clearing of additional land should have permitted maintenance of the wheat acreage at the earlier figure, and should have benefited revenue, but the tempo of improvement was apparently satisfactory to the farmer in the particular circumstances in which he was placed.

TABLE 7

Comparison of Organization of Farm B in 1950 and 1960, Before and After Pasture Improvement, at 1959-60 Prices

Item	1950	1960	Change
	£	£	£
Seed and Grain Sales	4,050	1,500	— 2,550
Wool Revenue	3,827	6,895	+ 3,068
Sheep and Lamb Sales, less Purchases ..	2,883	6,293	+ 3,410
Cattle Sales, less Purchases	120	2,700	+ 2,580
Gross Revenue	13,167	20,168	+ 7,001
Net Revenue†	6,260	10,922	+ 4,662
Approximate Capital Invested*	69,000	85,000	+ 16,000
Net Revenue as Percentage of Capital Invested	9.1 %	12.8 %	+ 3.7 %
Return to Added Capital in 1959-60 .. .. .	..	29.1 %	..
Expenses ÷ Gross Revenue .. .. .	.52	.46	..

† Includes return to operator's labour and management.

* At market value, dwelling (£4,500) excluded.

Management Problems of Partly Improved Farms

Tables 8 and 9 predict the change in net revenue and vulnerability to a further fall in product prices for the two properties, assuming constant costs for non-agricultural inputs and various percentage falls in products prices and the cost of agricultural inputs (i.e., livestock replacements) as at present organized, should prices recede from 1959-60 levels.

TABLE 8
*Effects of Cost-Price Squeeze on Property A At Stated Product Prices**

	Net Revenue			"Vulnerability" Ratio		
	As Organised in			As Organised in		
	1948	1957	1960	1948	1957	1960
<i>Wool Prices—</i>	£	£	£			
1959-60 level	1,408	2,807	12,148	·630	·489	·369
80 per cent of 1959-60	898	2,027	10,152	·764	·570	·411
50 per cent of 1959-60	132	856	7,157	·966	·760	·498
<i>Lamb and Sheep Prices—</i>						
1959-60 level	1,408	2,807	12,148	·630	·489	·369
80 per cent of 1959-60	1,236	2,569	10,592	·675	·512	·401
50 per cent of 1959-60	978	2,213	8,258	·743	·549	·462
<i>Cattle Prices—</i>						
1959-60 level	1,408	2,807	12,148	·630	·489	·369
80 per cent of 1959-60	1,329	2,726	11,852	·651	·497	·374
50 per cent of 1959-60	1,210	2,603	11,408	·682	·508	·383
<i>All Product Prices—</i>						
1959-60 level	1,408	2,807	12,148	·630	·489	·369
80 per cent of 1959-60	647	1,708	8,300	·830	·612	·461
50 per cent of 1959-60	-396	58	2,527	1·104	·979	·737

* Ignoring inventory losses.

TABLE 9
*Estimated Effects of Cost-Price Squeeze on Property B at Stated Product Prices**

	Net Revenue		"Vulnerability" Ratio	
	As Organised in		As Organised in	
	1950	1960	1950	1960
<i>Wool Prices—</i>	£	£		
As in 1959-60	6,260	10,922	·52	·46
80 per cent of 1959-60	5,833	9,937	·53	·47
50 per cent of 1959-60	5,193	8,460	·53	·49
<i>Lamb and Sheep Prices—</i>				
As in 1959-60	6,260	10,922	·52	·46
80 per cent of 1959-60	5,683	9,663	·53	·48
50 per cent of 1959-60	4,818	7,776	·55	·51
<i>Cattle Prices—</i>				
As in 1959-60	6,260	10,922	·52	·46
80 per cent of 1959-60	6,236	10,382	·52	·47
50 per cent of 1959-60	6,200	8,572	·52	·49
<i>All Stock Prices—</i>				
At 1959-60 Level	6,260	10,922	·52	·46
80 per cent of 1959-60	4,832	7,663	·57	·52
70 per cent of 1959-60	3,139	6,344	·67	·55
50 per cent of 1959-60	2,741	2,776	·68	·67

* Assuming that the cost of livestock inputs is directly proportional to the price of livestock products.

It is apparent that both properties are better able to withstand a cost-price squeeze at 1959 prices than if they were still organized as they were before pasture improvement ten years ago. Many landholders in New England could be in a similar position to that in which the owner of property A found himself at the end of 1957, *i.e.*, with a farm partially improved. Not all may find themselves in the same financial situation as he if they use different management techniques. Concentration on wool production at the expense of fat lambs could conceivably have been more profitable in the case studied. The increase in absolute level of income may be high enough to allow the operator to maintain his position in the face of a price decline provided he is not obliged to service increased external debt. But if the conditions on property A reflect a general situation, the landholder with access to limited capital has a difficult task in developing his property piecemeal although very high marginal rates of return to investment in pasture improvement can be attained once the property reaches a sufficient level of development. The implications for a lending authority under such conditions would surely be that once a client is financed for any pasture improvement the interests of both borrower and lender are liable to be best served if the project is pursued to finality as expeditiously as possible. This may ultimately entail the advance of considerable sums of money and, of course, a budgeted system of repayments. However, it is unlikely that every landholder will find himself as favourably situated as "A" within so short a time.

There is the evidence of farm A of this study and from the records of other farms made available to this University that special management problems may attach to partly improved properties in New England. As some properties are managed there is an apparent threshold value as an increasing proportion of the property is improved such that physical returns (and net financial returns to added investment) increase once a certain stage of development is reached.

Gruen⁷ has tabulated the levels of production expected or attained after pasture improvement in a number of surveys of sheep properties, including many Northern Tablelands properties. In the main these are substantially below those achieved experimentally by CSIRO and Department of Agriculture investigators at "Chiswick" and "Shannon Vale" Research Stations and by a minority but significant number of practising farmers. Most of the farms dealt with in these surveys were but partly improved.

Considering farm A, with the methods of management adopted, it seems that the response, in extra wool, lamb and cattle produced, was at least as great from each acre improved by aerial topdressing as from each of the 300 acres improved via prepared seed bed which was some four times more costly. This is suggestive that better results may follow extensive, in contrast to intensive, methods of improvement at the outset of property development.

The question which remains to be answered is the possible advantage which might have been derived from running some other type of flocks on the property in its initial development stage. While four-fifths of the property was unimproved, should the owner have run this unimproved area as a separate "wether" sub-farm? One large landholder near Armi-

⁷ *Loc cit.*

dale does indeed follow this practice but its practicability on a farm of the size of farm A in relation to fencing requirements and the handling of separate flocks of sheep is an open question.

The experience of the owner of farm A, paralleled by that at Shannon Vale and on other district properties, was that sheep given access to improved pasture virtually refused to eat native pasture subsequently. Thus production from the unimproved section of the property apparently fell when the remainder was improved. The obvious solution suggested earlier—two flocks of sheep grazing exclusively on improved and unimproved country respectively—may be subject to such difficulties that in practice the farmer is faced with the situation that until improvement has advanced to a certain critical proportion of the property he must operate below his potential physical possibilities.

The two properties considered appear to have no unique features which would prevent duplication of the results secured elsewhere in their respective districts. There are undoubtedly many similar properties adjacent to each where much the same pattern of development could be followed. The individual owners are possibly of somewhat better than average managerial ability—the relatively low outlay on buildings and machinery may reflect this—but again there are without doubt many men competent to follow or even improve on the examples which the owners of the survey properties have set.

Summary and Conclusion

Budgets for two properties on which pasture improvement has permitted an increase in the number of stock carried over the last ten years show that each has a higher level of disposable income than would have been secured if this development had not been undertaken.

In each case the percentage fall in net income following a price decline will be significantly less than was likely to be the case had the operators retained the organization existing in 1950. Average rates of return to new investment were of the order of 29 per cent in one case and 85 per cent in the other.

One of the properties was situated in New England and had been operated for some time on a partly pasture improved basis. There were definite indications that under these conditions both the gross and net rate of return to investment in pasture improvement was much less than that attained when the property was fully improved. The hypothesis that this resulted because insufficient time had elapsed to obtain the full benefit from the pastures sown initially is discounted.

On the basis of the results on this one property, supported by inference from general experience in the area it is suggested that increasing returns to investment in property development via pasture improvement may be secured as an increasing proportion of the property is improved. Under such circumstances the farmer attempting property development piecemeal is faced with a difficult task if he meets declining prices in the early stages of his improvement programme, while the interests of borrowers and lenders will be best served if loans are adequate to enable development past some critical point by which time a substantial part of the property may be improved.

Appendices

APPENDIX I

*Budget for Property A as Organized in 1948-49
At 1959-60 Costs and Prices*

Revenue		Expenses	
<i>Wool—</i>	£		£ £
1,000 Ewes x 7 lb. @ 70d.,	2,042	Shearing 1,050 @ 4s. 6d. ..	236
50 Rams x 10 lb. @ 62d.	129	Crutching twice, 1,250 @	
Lambswool	381	6½d.	68
<i>Fat Lambs—</i>		Drenching 9 x 1,050 @ 6d.,	236
200 @ 75s.	750	3 x 400 @ 6d.	30
<i>C.f.a. Sheep—</i>		Dipping 1,050 @ 4d.	18
110 @ £1	110	Vet—Black Disease 400 @	
<i>Yearling Steers—</i>		2d.	3
12 x £33	396	Jetting 2 x 1,050 @ 4d. ..	35
			626
		<i>General Expenses—</i>	
		Repairs and Maintenance ..	360
		Shire Rates	175
		P.P. Board	15
		Fuel	150
		Contract Services*	350
		Sundries	201
			1,251
		<i>Depreciation—</i>	
		Fencing 2½% on £5,300 ..	132
		Buildings 2½% on £1,600 ..	40
		Machinery 10% on £2,000	200
			372
		<i>Wool Marketing Charges—</i>	
		Freight £2 bale x 30 bales ..	60
		Wool Tax 6s. bale	9
		Handling @ 18s. 6d. bale	27
		Insurance 5s. per £100 ..	6
		Commission 2½% on first	
		£1,000, 1½% thereafter ..	49
			151
		Total Expenses	2,400
		Net Revenue	1,408
Total	3,808	Total	3,808

* Items such as cartage, commissions, repair of entrance road by shire machinery and the like expenditure.

APPENDIX II

*Budget for Property A as Organized in 1959-60
At 1959-60 Costs and Prices*

Revenue		Expenses	
<i>Wool—</i>	£	<i>Sheep Expenses—</i>	£
2,800 Ewes x 11.8 lb. @ 70d.	9,637	Shearing 2,900 @ 4s. 6d.	653
100 Rams x 13.3 lb. @ 62d.	344	Crutching 2,900 twice @ 6½d.	151
<i>Fat Lambs—</i>		Drenching 2,900 x 7 @ 6d.	507
1,860 @ 71s.	6,603	1,800 x 3 @ 6d. ..	138
<i>Fat Culls, c.f.a.—</i>		Dipping 2,900 @ 4d. ..	48
589 @ £2	1,178	Black Disease @ 2d., 1,860 Lambs ..	15
<i>Vealers—</i>		Jetting 2,900 x 2 @ 4d. ..	96
40 @ £37	1,480	<i>Labour—</i>	
		1 Permanent	750
		Casual	248
		<i>General Expenses—</i>	
		Repairs and Maintenance ..	461
		Shire Rates	175
		P.P. Board Rates	39
		Petrol and Oil	320
		Contract Services	770
		Sundries	201
		<i>Depreciation—</i>	
		Buildings 2½% on £2,000 ..	50
		Machinery 10% on £3,500 ..	350
		Fencing 2½% on £6,375 ..	160
		<i>Fertilizer—</i>	
		1,480 Acres @ 18s. ..	1,332
		<i>Wool Marketing Charges—</i>	
		Freight, 138 bales	276
		Tax	41
		Handling	127
		Insurance	25
		Commission	160
		<i>Total Expenditure</i>	<i>7,094</i>
		<i>Net Revenue</i>	<i>12,148</i>
Gross Returns	19,242	Total	19,242