THE IMPORTANCE OF DIFFERENT TYPES OF CAPITAL INVESTMENT ON BEEF PROPERTIES IN QUEENSLAND

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Summary

Statistical analysis of time series data in the southern spear grass region indicates that graziers should invest in pasture improvement for rapid increases in beef production. However, results from a survey of properties in the region suggest that graziers tend to favour low productivity investments such as buildings, fences and water supplies rather than pasture improvement. The need to reorientate graziers' attitudes towards investment is indicated.

I. INTRODUCTION

Favourable market prospects for the beef industry in the long term suggest that production should be increased. Hamilton and McCarthy (1968) showed that capital was the key factor likely to promote increased output and that greater use of capital inputs, relative to other factors of production, could increase production significantly.

In this paper, different types of capital investment are examined to delineate the particular forms which will give the most rapid increases in output.

II. METHODS

Capital inputs can be measured in a variety of ways. In this study, seven different measures were used in an attempt to relate output to resource inputs over the period 1952 to 1967, as follows:-

(i) Total area of land used
(ii) Value of land used
(iii) Value of permanent improvements derived from an index of prices paid by primary producers
(iv) Value of permanent improvements derived from property sales during the period
(v) Value of land plus permanent improvements (ii) and (iv)
(vi) Ratio of improved pasture to the total area of land
(vii) Ratio of breeding cattle to the total number of cattle.

Measures (i) and (ii) may be described alternatively as land inputs, while (vi) and (vii) may be called technological variables.

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Output was expressed as the number of cattle slaughtered and the value of cattle slaughtered. Other variables which were examined included the labour force, the value of labour, a measure of available extension services, and average district rainfalls.

Least-squares regression techniques were used to calculate regression coefficients, standard errors and adjusted coefficients of multiple determination for each of 17 different combinations of variables. The regression equation which gave the "best" description of output in terms of resource inputs was selected for interpretation.

Data relating to productivity and graziers' attitudes were drawn from a survey of 82 properties 'in the region described by Hamilton and McCarthy (1964). Data relating to the capital structure of beef properties were derived from 21 properties which were part of a nationwide survey outlined by Keating (1967).

III. RESULTS

Regression analysis of time series data normally exhibits multicollinearity between the variables. This study proved no exception. Thus, although all 17 functions explained 70 per cent or more of the variations in either of the two measures of output, few of the functions contained regression coefficient significant at the .05 level.

Physical labour and extension services were highly correlated with all variables except rainfall. Both land variables. were highly correlated with the two measures of permanent improvements. The combined value of land and permanent improvements was highly correlated with pasture improvement as was the ratio of breeders to total stock numbers.

The interrelationships among the variables indicated that output could be expressed adequately by the relatively simple equation

$$Y = N^{-1.03} F^{0.103} p^{3.71} \ldots\ldots\ldots\ldots R^{-2} = 0.73$$

(Standard error of exponents; 0.010, 0.040, 0.49 respectively.)

where Y = value of cattle slaughtered
N = value of labour
F = value of permanent improvements (buildings, fences and water supplies)
P = ratio of pasture improvement to total area.

All exponents were significant at the .05 level.

The regression equation emphasises the importance of pasture improvement to past trends in output. For a 1 per cent increase in pasture improvement there was a 3.7 per cent increase in output, compared with a response of only 0.1 per cent resulting from a 1 per cent increase in permanent improvements. The negative coefficient for labour implies that economies in labour use are warranted.

During the 16 year period, expenditure on labour increased at a rate of 0.1 per cent annually. Investment in permanent improvements increased at a rate of 5.83 per cent annually but pasture improvement increased at only 2.58 per cent per year. Thus, graziers have tended to favour investment in low productivity improvements rather than the more productive pasture improvement.

The remainder of this paper is concerned with graziers' attitudes towards the two forms of investment. For convenience, the two forms are called:—

High Productivity Investment (HPI) which refers to partial clearing of standing timber and sowing of improved pastures.

Low Productivity Investment (LPI) which includes expenditure on buildings, fences, water supplies and yards.

IV. DISCUSSION

An indication of graziers' attitudes towards investment priorities was obtained from graziers with definite plans for property improvement and who were willing to borrow funds. The priorities given by the 39 graziers (out of 82 interviewed) are shown in Table 1.

Top priority-was given to investment in permanent improvement, followed closely by purchase of additional cattle. Less than one-third of the respondents indicated a willingness to borrow for investment in pasture improvement.

If the priorities listed are typical of the attitude of all graziers then a major reorientation of attitudes is necessary. This is reinforced by four graziers who stated that they definitely would not borrow for pasture improvement.

In spite of the high priority given to LPI, graziers' minds were not closed to pasture improvement. 70 per cent of all graziers interviewed envisaged the introduction of improved pastures as a major improvement to their properties. 63 per cent of this group also indicated that additional LPI depended on the successful outcome of the improved pastures.

Survey data suggest that, initially, further investment should be devoted to clearing the remaining 22 per cent of suitable land on the sample properties. Productivity of this area could be more than doubled with a minimal allocation of funds for additional permanent improvements. Subsequent investment should be directed towards increasing the average area. of improved pasture from its present 7.6 per cent to its maximum potential of 45 per cent of the area, that is, the estimated area negotiable by a wheeled tractor. Application of known technology could treble carrying capacity above the levels on partially cleared land. During this phase of development additional permanent improvements would be needed for efficient property management.

There remains the problem of reorientating graziers' attitudes towards increased investment in pasture improvement. This should include comprehensive dissemination of economic analyses of pasture improvement.

To date, only limited studies of the profitability of large scale pasture improvement have been made. Fox (1960, 1961) used partial budgeting to assess the

TABLE 1

*Investment priorities with borrowed funds**

Item	No. of Graziers
Permanent improvements	24
Livestock	22
Anything	10
Improved pasture	1
Number of respondents†	39

*Average size of property was 9477 ha of which 58.7 per cent was partially cleared, 8.2 per cent was improved pasture and crops, and 33.1 per cent was standing timber. Average herd size was 1430 cattle from which 368 cattle were sold for slaughter annually.

†Several graziers mentioned more than one item for which they would borrow.

profitability of small areas of improved pastures in the Bundaberg and Eidsvold districts. However, the establishment costs were too high to be adopted on a large scale and McCarthy and Hamilton (1966) doubted whether such small areas would boost production significantly in the aggregate. Moyle and Haug (1965) examined a number of case studies in a preliminary assessment of pasture improvement for a wider range of localities. Their results, although encouraging, lacked sufficient data from commercial properties over time. Haug and Hirst (1967) investigated development of two hypothetical properties, one establishing Townsville Stylo and the other relying on increased cropping. While providing a suitable framework for assessing pasture improvement, the study was not suitable for extension purposes.

TABLE 2

Comparative budgets showing gains from pasture improvement

Item	Stage of Development				Increases Resulting from Change
	Current		Fully Developed		
Capital					$
Land					44,470
Improved pasture	20,906		115,791		94,885
Ringbarking	87,912		53,018		—34,894
Unimproved	35,182	143,998	19,659	188,468	—15,523
Livestock		143,000		325,600	182,600
Permanent improvements		10,496		23,899	13,403
Plant & equipment		4,680		4,680	—
Total capital		302,174		542,647	240,473
Gross returns		32,384		73,656	43,272
Operating costs					
Labour					
Permanent	6,552		15,281		
Contract	1,500	8,052	1,636	16,917	8,865
Materials					
Fuel	1,114		2,785		
Feed seed fertilizer	736		1,619		
Dipping	858		1,954		
Repairs & maintenance	444		712		
Other	135,	3,287	278	7.348	4,061
Services					
Freight & cartage	736		1,674		
Marketing	590		1,255		
Other charges	182		400		
Rates & taxes	825		825		
Insurances	129		198		
Other	585	3,047	635	4,987	1,940
Depreciation		701		1,103	402
Total costs		15,087		30,355	15,268
Net income		17,297		43,301	26,004
% Return on capital		5.7		8.0	

The simplest way in which the profitability of pasture improvement can be presented is the form of comparative budgets. An example is summarised in Table 2.

The largest increase in capital was the value of livestock. It is reasonable to expect that cattle numbers will increase naturally, that is, no additional cattle are purchased. Hence, the rate of increase could limit the rate of development.

Investment in improved pastures, while appearing as a major expenditure item, include some clearing costs which would have accrued in any case. Assuming no additional plant and equipment is required, the least important new investment is for permanent improvements.

Overall, the return on capital rises from 5.7 per cent to 8 per cent.

V. CONCLUSIONS

Expenditure on pasture improvement is the most productive form of investment. A necessary condition for implementing this policy on a large scale is the reorientating of graziers' attitudes towards their investment priorities. The simplest way of demonstrating the efficacy of pasture improvement is by use of comparative budgets showing the current and fully developed stages of property organization.

VI. REFERENCES

FOX, N. F. (1960). *Qd agric. J.* 86: 745.

FOX, N. F. (1961). *Qd agric. J.* 87: 92.

HAMILTON, C. P., and MCCARTHY, W. O. (1964). *Proc. Aust. Soc. Anim. Prod.* 5: 209

HAMILTON, C. P., and MCCARTHY, W. O. (1968). *Proc. Aust. Soc. Anim. Prod.* 7: 148.

HAUG, N. F., and HIRST, G. C. (1967). *Q. Rev. Agric. Econ.* 20: 113.

KEATING, C. (1967). *Q. Rev. Agric. Econ.* 20: 192.

MCCARTHY, W. O., and HAMILTON, C. P. (1966). *Proc. Aust. Soc. Anim. Prod.* 6: 263.

MOYLE, R. G., and HAUG, N. F. (1965). *Q. Rev. Agric. Econ.* 18: 43.