Testing the Economic Viability of Controlled Traffic Cropping

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ABSTRACT

A method for calculating the profitability of controlled traffic systems was demonstrated using an example from the Moree area in northern NSW. A partial budgeting approach was used to assess the economic viability of a controlled traffic system in terms of marginal return on capital and cashflow approach.

INTRODUCTION

There is a lack of information on the profitability of controlled traffic cropping systems in Australia (Wylie 2007). The methodology used does not have to be overly complicated (Malcolm 2004), but good information on the costs and benefits of the system are required to obtain a reasonably accurate estimate of potential profitability. This paper outlines a method for calculating the profitability of controlled traffic systems using an example from the Moree area in northern NSW.

METHODS

Initially, a partial budgeting approach was used to assess the economic viability of the system in terms of marginal return on capital (Patton 2001; Malcolm *et al.* 2005). Then a cashflow approach was taken to evaluate the impact of the enterprise change on cropping system profitability (Malcolm, Makeham et al. 2005).

A partial budget is a method of assessing the likely value of making a change (such as growing a new crop or altering machinery resources) by comparing it with the existing situation. In a partial budget, the extra costs and returns of the change are compared with those of the existing situation. The net returns or losses can then be expressed as a percentage return on extra (or marginal) capital. This measure provides an initial basis for comparison with other investment alternatives (Patton 2001).

If the return on extra capital percentage is high enough, then the technology change merits further investigation. This is usually done using a cash flow budget since it may take some years for the full returns to become evident. If the return on extra capital percentage is too low, the change would usually be rejected. A grower may reject the idea as they believe they can achieve a higher return on the capital by investing elsewhere. This could be an alternative investment on-farm, such as installing more grain storage.

The example used here uses data from a large farming operation to the south of Moree in northern NSW. The existing cropping system was no-till, but the old 'round and round' pattern of spraying and sowing had been kept. The existing five-year crop rotation (long fallow wheat- chickpeas-wheat-long fallow sorghum) was not altered when controlled traffic was introduced and the farm manager did not feel that yields overall had changed due to the introduction of controlled traffic. The 2-metre paddock tramlines were marked out by a contractor for $6.00/hectare and two new 24-metre width boomsprays were purchased. The existing planter was also kept with little alteration required to suit the controlled traffic system.

The farm manager noted that in the existing no-till system, the overlap in a paddock was up to 20%, in one instance, "We used enough chemical for 350 hectares to cover a 286 hectare paddock". This was due to marker foam evaporating before the operator got back around again. Therefore, overlap assumptions were 20% for spraying operations and 5% overlap on sowing operations for the conventional no-till system, and 2% overlap for both spraying and sowing operations under controlled traffic.

Full gross margin budgets were constructed for each crop in the rotation and the Moree region long-term average yields were used in the calculations.

- Short fallow wheat 2.2 t/ha (AH12 grade)
- Long fallow wheat 2.7 t/ha (PH13 grade)
- Chickpeas 1.50 t/ha
- Sorghum 3.3 t/ha

Early 2008 prices were used for crop variable costs such as seed, fuel and oil, herbicides (Roundup CT $12.50/L) and fertilisers (Starter Z $1320/tonne, anhydrous ammonia $1140/tonne). A crop area of 2000 hectares was assumed. Labour savings were costed at $20 per hour.

Recent (2000-2008) average prices were used for wheat ($217/tonne PH13, $199/tonne AH12), chickpeas ($439/tonne) and sorghum ($211/tonne).

RESULTS

Table 1 shows the differences in gross margin returns, the differences are due solely to cost savings from reduced overlap.

Table 1: Gross returns

A. Existing rotation - no-till					
Area		**Crop/Fallow**		**GM/ha**	**GM/activity**
1,600	ha	Summer Fallow		-$64	-$ 101,851
800	ha	Winter Fallow		-$64	-$ 51,079
400	ha	Short Fallow Wheat		$ 162	$ 64,786
400	ha	Long Fallow Wheat		$ 257	$ 102,918
400	ha	Chickpeas		$ 294	$ 117,771
400	ha	Long fallow Sorghum		$ 399	$ 159,675
				Total crop gross margin	**$ 292,221**
		Estimated labour cost @ $20.00/hr	477 hrs		$ 9,542
B. Controlled traffic plus no-till					
Area		**Crop/Fallow**		**GM/ha**	**GM/activity**
1,600	ha	Summer Fallow		-$54	-$86,834
800	ha	Winter Fallow		-$54	-$43,417
400	ha	Short Fallow Wheat		$ 167	$66,878
400	ha	Long Fallow Wheat		$ 267	$106,678
400	ha	Chickpeas		$ 312	$124,920
400	ha	Long fallow Sorghum		$ 415	$165,982
				Total crop gross margin	**$334,207**
		Estimated labour cost @ $20.00/hr	447 hrs		$8,950
				B- A: Expected change in returns	**$42,579**

Table 2 summarises the capital outlay assumptions.

Table 2: Capital outlay

	Capital outflow	Capital inflow
Purchases 2 x 24m boomsprays Marking out @ $6/ha	 $ 100,000 $ 12,000	
Sales eg. sell old boomsprays		 $28,000
Expected extra capital cost	**$84,000**	

The return on marginal capital is 51% as shown below. This indicates a reasonably good return.

$$\text{Return on marginal capital} = \frac{\text{Change in returns}}{\text{Extra capital}} \times \frac{100}{1} = \frac{\$42{,}579}{\$84{,}000} = 51\%$$

A cash flow budget was set up which covered six years on a monthly basis. Interest costs were not included in the cash flow since different financing options can affect the amount of interest liability. However, in calculating the Net Present Value, a marginal tax rate of 10% was used to allow for tax deductibility of capital items as well as tax liability on extra income.

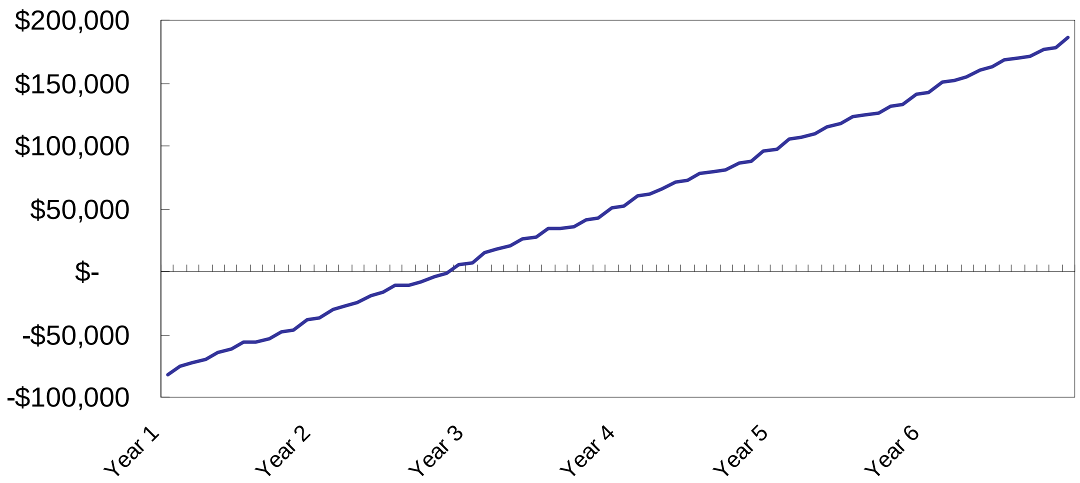

Figure 2: Cashflow difference between controlled traffic and conventional over 6 years

Other scenarios

In the late 1990s surveys by the Kondinin Group observed that typical overlaps in conventional no-till cropping systems were between 5 and 10%. Tullberg (2001) stated that “Farmers adopting controlled traffic often report reductions in the time and material input to operations of 10 - 20%.” Other literature has stated that yield improvements have been observed under controlled traffic conditions (Jones 2000; Li *et al.* 2007). As shown in Table 3, an improvement in yield due to improved soil conditions, whether that is due to improved root penetration and nutrient uptake or improved water storage capacity, can have a significant impact on returns.

Table 3: Alternative Assumptions

Scenario	Rate of Return
10% overlap conventional no-till	28%
5% yield improvement	104%
10% yield improvement	158%
10% overlap conventional no-till and 5% yield improvement	81%
10% overlap conventional no-till and 10% yield improvement	135%

CONCLUSION

The economic benefits from controlled traffic are reasonably easy to calculate with simple budgeting tools such as partial and cash flow budgets. In this example, an improvement in yields combined with cost savings from reduced equipment overlap was shown to have a significant positive impact in profitability.

However, detailed information on the cropping systems both before and after the change is required to calculate the potential profitability change with any accuracy. The magnitude of the change in profitability is likely to vary widely between farms with a number of key factors, such as the level of capital investment; cost savings gained, and yield improvements. Further research is required to quantify the benefits before any general messages could be proposed about the profitability of the system.

REFERENCES

Jones, J. (2000). Traffic farming can boost yields, *Australian Farm Journal* July 2000: 44-46.

Li, Y.X., Tullberg, J.N. and Freebairn, D.M. (2007). Wheel traffic and tillage effects on runoff and crop yield, *Soil & Tillage Research* 97: 282-292.

Malcolm, B., Makeham, J.P. and Wright, V. (2005). *The Farming Game: Agricultural Management and Marketing*. Cambridge University Press, Melbourne.

Malcolm, L.R. (2004). Farm management analysis: a core discipline, simple sums, sophisticated thinking, *Australian Farm Business Management* 1: 45-56.

Patton, D.A. (2001). Evaluating enterprise change and capital investments: partial and break-even budgets, *Agfact M1.2*. NSW Agriculture, pp 8.

Tullberg, J.N. (2001). Controlled traffic for sustainable cropping, *10th Annual Australian Agronomy Conference*, Hobart, Tasmania.

Wylie, P. (2007) *High Profit Farming in Western Australia 2007:* A new era in grain farming. Horizon Rural Management/GRDC, Dalby, Queensland, pp 15 pages.