Fallow management

Calculating the profitability of different fallow management options

August 2007

Introduction

The method used to manage a fallow can influence your overall farm profitability. The benefits of a well managed fallow include improved soil health, reduced weed control costs, a reduction in the number of machinery operations and an increase in sugarcane productivity. Growers generally have two main options for managing their fallow; 1) bare fallow or 2) rotational crop.

A bare fallow predominantly involves the use of tillage or herbicides to keep the block free of weeds and volunteer cane. Growing a rotational crop generally uses legumes like soybeans or cowpeas because of their soil health and nitrogen benefits. This paper looks into some of these methods and the flow on effects on farm profitability.

Fallow management should never be viewed in isolation, as it is an integral part of the cane farming system. In this analysis we will investigate the effect of fallow management and farming system practices on the whole of farm profitability.

There are many factors to consider when looking at different fallow management options. These include the type of farming system practices used and the suitability of a legume crop to a particular situation. Legume crops may not be suited to all situations, therefore it is recommended to consult with your local agronomist for more specific advice.

One method of examining the options is to work through an example. In this case we will look at four options that are based on some common fallow management and farming system practices used in the Herbert region.

Legumes and new farming system

Legumes and zonal tillage system

Scenarios

Farmer Jack grows sugarcane on a 120 hectare farm in the Herbert river district. Jack currently uses a bare fallow conventional farming system. His bare fallow operations include a mixture of tillage and herbicide applications to manage weeds and eradicate the old cane stool. Jack uses a billet planter contractor to conventionally plant his cane on a single row at 1.52m spacing.

Jack recently met with his local agronomist and discussed using a legume green manure crop in his fallow. The agronomist told Jack that a plant cane crop yielding 100 tonne per hectare needs about 140 kg/ha (range 100 – 160) of nitrogen. A well managed legume fallow can produce about 140 - 300kg/ha of nitrogen, depending on the type of legume and growing conditions. Given the high price of fertiliser at present, Jack believes that this could present a cost saving to the farming business. The agronomist also explained to Jack the numerous soil health benefits of legumes. Whilst Jack acknowledges these benefits, at this stage he would like to focus on the cost savings to ensure that he is not worse off after the change.

The agronomist also spoke to Jack about using a new farming system based on pre-formed mounds and a disc opener cane planter. Jack agreed to take the new farming system into consideration when determining the costs of each fallow management and farming system. Jack also spoke to some of his neighbours who are currently growing legumes in their fallow to determine some of the options and the changes required. At this stage, Jack does not want to invest in additional machinery capital and would prefer to source contractors if specialist equipment is required.

Legumes and conventional system

Bare fallow system

With some assistance from the local agronomist, Jack used the DPI&F FEAT program to calculate the cost of various fallow management practices and the effect of a farming system change on farm profitability. The four scenarios they looked at included:

- Legume fallow with new farming system practices (NFS)
- Legume fallow with zonal tillage practices
- Legume fallow with conventional farming practices
- Bare fallow with conventional farming practices (current situation)

Growing Practices

Table 1 outlines Jack's current growing practices compared to these different scenarios with a legume fallow. These scenarios are based on Jack's discussions with his local agronomist and other farmers currently using these farming systems. Jack decided to try Ebony Cowpeas because a mate of his had a very good result during a wet year. Jack currently does not own a legume planter and therefore factored in the cost of hiring the machine. If Jack decided to use pre-formed mounds, he would also need to use a contractor to carry out this machinery operation.

Table 1. Growing Practices

Characteristics	Legume Fallow/NFS	Legume Fallow/Zonal Tillage	Legume Fallow/Conventional	Bare Fallow/Conventional
Row spacing	1.9m Dual (controlled traffic)	1.55m	1.55m	1.55m
Fallow Management - *land preparation* - *planting* - *Weed Control*	Ebony (hire planter) 2 x chemical	1 x zonal ripper + rotary hoe Ebony (hire planter) 2 x chemical	3 x offset discs Ebony (hire planter) 2 x chemical	3 x offset discs N/A 1 x chemical
Planting method	Double disc GPS (contractor)	Furrow opener (contractor)	Furrow opener (contractor)	Furrow opener (contractor)
Land preparation (plant cane)	3 x offset disc 1 x ripper 1 x mounding GPS (contractor)	1 x zonal ripper 1 x zonal rotary hoe	3 x offset disc 1 x ripper 1 x rotary hoe	3 x offset disc 1 x ripper 1 x rotary hoe
Plant cane fertiliser	DAP @ 185kg/ha (1.5bags/acre) Potash @ 185kg/ha (1.5 bags/acre)	GF351 @ 247kg/ha (2 bags/acre) Potash @ 124kg/ha (1 bag/acre)	GF351 @ 247kg/ha (2 bags/acre) Potash @ 124kg/ha (1 bag/acre)	GF 351 @ 247kg/ha (2 bags/acre) GF 505 @ 309kg/ha (2.5bags/acre)
Ratoon cane fertiliser	GF 501 @ 618kg/ha (5 bags/acre)	GF 501 @ 618kg/ha (5 bags/acre)	GF 501 @ 618kg/ha (5 bags/acre)	GF 501 @ 618kg/ha (5bags/acre)
Plant weed control	2 x Chemical	4 x mechanical 2 x chemical	4 x mechanical 2 x chemical	4 x mechanical 2 x chemical
Ratoon weed control	Chemical	Chemical	Chemical	Chemical

All blocks had lime at 2500kg/ha (1tone/acre)
#Lorsban and Bumper applied to all treatments at planting
*Fertilizer recommendations are based on Jack's individual situation. Please seek professional advice for specific recommendations.

Results of FEAT analysis

In undertaking the analysis it was necessary to make various assumptions. The economic analysis focuses on each scenario when it is in full operation. Variable costs are based on August 2007 prices. The calculations for Jack's machinery operations take into account tractor size, fuel consumption, implement speed, width, field efficiency and repairs and maintenance. Tables 2, 3 and 4 outline the fallow, plant and ratoon cane costs respectively in each scenario.

The overall economic effect on Jack's farming business is displayed in Table 5. Jack's fixed costs, capital investment and farm productivity were held constant in each scenario. Figures are based on Jack growing a good legume crop in his fallow.

Disc opener cane planting

Table 2. Fallow costs

Fallow Expenses	Legume Fallow/NFS	Legume Fallow/Zonal Tillage	Legume Fallow/ Conventional	Bare Fallow/ Conventional
	$/ha	$/ha	$/ha	$/ha
Land preparation	0.00	101.09	89.33	89.33
Seed & inoculum	58.80	58.80	58.80	N/A
Planting	47.66	49.63	49.63	N/A
Weed control	73.34	73.34	73.34	35.67
Total fallow expenses	179.80	282.86	271.10	125.00

Table 3. Cost of growing plant cane

Expenses	Legume Fallow/NFS	Legume Fallow/Zonal Tillage	Legume Fallow/ Conventional	Bare Fallow/ Conventional
	$/ha	$/ha	$/ha	$/ha
Land Preparation	215.94	101.09	237.16	237.16
Planting + Seed	593.71	544.96	544.96	544.96
Fertiliser & Soil Ameliorants	505.81	507.78	507.78	631.58
Weed Control	123.77	214.32	214.32	239.32
Insect Control	30.00	20.00	20.00	20.00
Disease Control	6.00	6.00	6.00	6.00
Total growing expenses	1475.23	1394.15	1530.22	1679.02

Table 4. Cost of growing ratoon cane

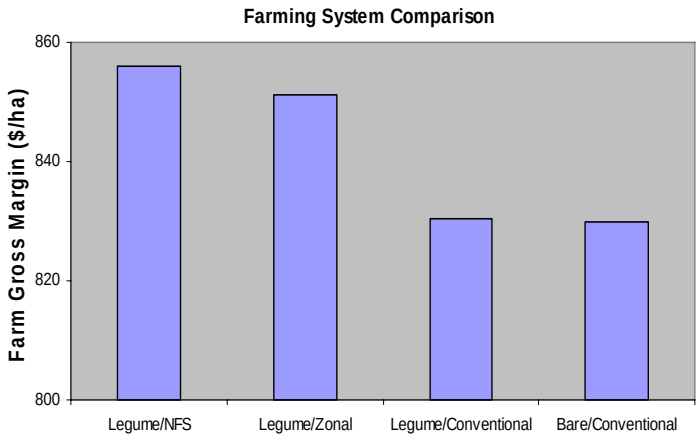
Expenses	Legume Fallow/NFS	Legume Fallow/Zonal Tillage	Legume Fallow/ Conventional	Bare Fallow/ Conventional
	$/ha	$/ha	$/ha	$/ha
Fertiliser	410.95	412.92	412.92	412.92
Weed Control	19.89	19.89	19.89	19.89
Total growing expenses	430.84	432.81	432.81	432.81

Table 5. Economic comparison of the four scenarios

Expenses	Legume Fallow/NFS	Legume Fallow/Zonal Tillage	Legume Fallow/ Conventional	Bare Fallow/ Conventional
Price per tonne sugar	300	300	300	300
Average yield cane (tonnes/ha)	90	90	90	90
Farm gross margin ($/ha)	856	851	830	830
Farm operating return ($)	37 623	37 037	34 551	34 500
Cane tractor labour (h/ha)	1.07	1.46	1.91	1.91
Fallow tractor labour (h/ha)	0.17	0.64	0.66	0.40
Total tractor labour (h/ha)	1.24	2.10	2.57	2.31

Conclusion

Jack's economic analysis showed that a legume fallow with the new farming system provided the highest farm gross margin ($856/ha) and farm operating return ($37 623). This represents a $3 123 increase over his bare fallow and conventional farming practice. The improvement in profitability was a result of less tractor operations, fertilizer savings and lower weed control costs. In addition to the cost savings, the amount of time Jack spends on a tractor will also decrease by over 45% or 128 hours across the entire farm (2.31 – 1.24hrs/ha).



If Jack decided to use a legume fallow with zonal tillage his farm gross margin and farm operating return would be $851/ha and $37 037 respectively. Although the system was not quite as profitable as the new farming system option, Jack would still be better off compared to his current bare fallow practice. The tractor labour hours required with this system were 9% lower (2.31 – 2.10hrs/ha) than Jack's current farming practice.

The legume fallow with conventional farming practices provided a similar farm gross margin ($830/ha) and farm operating return ($34 551) compared to Jack's current bare fallow system. The fertilizer and weed control savings from the legume crop helped to offset the additional costs of growing a legume crop using this system. The extra cultivation required to grow the legume crop caused the tractor labour hours to be higher (2.31 – 2.57hrs/ha) than the bare fallow scenario.

The economic analysis indicates that Jack will not be worse off if he is able to grow a good legume fallow. In fact, the legume fallow scenarios provided a higher farm operating return compared to Jack's current system. As mentioned earlier, a legume fallow improves your overall soil health and can lead to higher sugarcane productivity and further economic benefits that are not considered in this analysis. This analysis is in no way intended to provide specific advice for your own situation. Before growing a legume crop, consult with your local agronomist to determine if a legume fallow crop is suitable to your own specific situation.

Prepared by:
Mark Poggio, ph: (07) 4776 3907, mark.poggio@dpi.qld.gov.au
Mike Hanks, ph: (07) 47222 530, michael.hanks@dpi.qld.gov.au
We would also like to acknowledge the contribution from several growers in the Herbert region for providing information to undertake the analysis.