Reduced N on late ratoons – economic case study, Ingham region

Grower: Norm Reid

Norm Reid farms 211 hectares in Toobanna, south of Ingham. Norm was interested in testing whether he can reduce his fertiliser application rates in older ratoons without sacrificing yield, resulting in improved profitability and environmental outcomes. As late ratoon sugarcane crops generally have a lower yield potential (and therefore take up less nutrients) compared to early ratoons,[1] lower fertiliser rates might be able to be applied to these crops without adversely affecting yield.

Key findings

- The reduced rate treatment recorded a higher average gross margin of $292 per hectare compared to the standard rate treatment.
- Analysis found that the difference in gross margin between the treatments was statistically significant.

Trial description

A trial consisting of two replicates of two nutrient treatments was established on a fourth ratoon block in Toobanna in 2014. The trial was harvested in late 2015.

Figure 1: Trial site

Table 1 outlines the products, application rates and product costs of each treatment. Treatment 1 is a standard application rate used as a control, and treatment 2 is the same product applied at a reduced rate.

Table 1: Trial products, application rates and product costs

	Product	Application rate	Product cost ($/ha)
T1	CB 99856	593 kg/ha	$401
T2	CB 99856	390 kg/ha	$264

Table 2 shows the amount of nitrogen, phosphorus, potassium and sulphur applied in the trial.

Table 2: Treatment nutrition analysis (kg/ha)

Treatment	N	P	K	S
T1	139.4	20.2	99.6	14.8
T2	91.7	13.3	65.5	9.8

Methodology

The following economic analysis examines the impact of each treatment on the ratoon gross margin.[2] The Farm Economic Analysis Tool (FEAT) was used to model Norm Reid's typical

[1] Chapman, L. S., Ferraris, R., Ludlow, M. M. (1992) Ratooning ability of cane varieties: variation in yield and yield components. Proceedings of the Australian Society of Sugar Cane Technologists, 14: 130-138

[2] Gross margin equals revenue minus variable costs, which include chemical, fertiliser, machinery and harvesting costs.

ratoon growing expenses such as fertiliser application costs, pesticides and other machinery operations.

The analysis assumes a sugar price of $430 per tonne[3]; a labour rate of $30 per hour; and a fuel price of $1 per litre (net of the diesel rebate and GST). Fertiliser and pesticide prices were sourced from local suppliers.

Results

Table 3 shows the production results from the trial block. While the reduced rate actually recorded higher tonnes of cane, CCS and tonnes of sugar than the control, analysis revealed that the differences were not statistically significant.

Table 3: Yield and CCS results

	Treatment	TCH	CCS	TSH
T1	Standard rate	95.6	12.5	12.0
T2	Reduced rate	98.0	12.8	12.5

TCH: tonnes of cane per hectare; CCS: commercial cane sugar; TSH: tonnes of sugar per hectare.

Table 4 shows the economic results from the trial. The higher yield and CCS associated with the reduced rate treatment resulted in an increase in revenue of $174 per hectare.

The higher yield recorded for the reduced fertiliser treatment resulted in a higher harvesting cost per hectare, however this was more than offset by the fertiliser savings from the lower application rate.

Table 4: Economic results

	Standard rate ($/ha)	Reduced rate (diff. to T1, $/ha)
Gross revenue	$3,133	$174
Variable costs	$1,238	-$118
Gross margin	$1,895	$292

Figure 2 presents the treatment gross margins along with error bars indicating the 95% confidence interval. Due to both higher revenue and lower costs, the gross margin for the reduced fertiliser treatment was $292 per hectare higher than the control treatment. Moreover, and despite the relatively low statistical power of the trial, this result was found to be statistically significant.

Figure 2: Gross margin

Values followed by a different letter are statistically different at the 5% level.

To extend the gross margin analysis further, a break-even analysis was conducted to determine the yield response required for the reduced fertiliser treatment to result in the same gross margin as the standard fertiliser rate. The break-even analysis assumes a constant CCS.

The analysis revealed that the reduced rate treatment would only need to achieve a yield of 90.1 tonnes per hectare (5.5 tonnes per hectare lower than the yield achieved by T1) to achieve the same gross margin as the standard rate treatment.

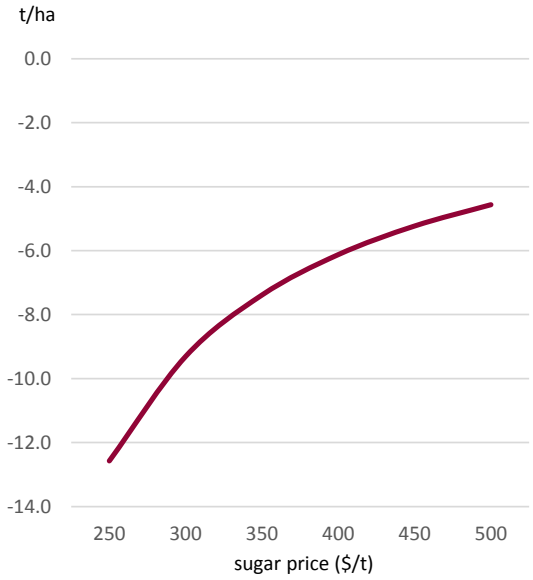
[3] $430 per tonne is the 5 year average (2010-14) of QSL's seasonal and harvest pools.

Sensitivity analysis

As the price of sugar is highly variable, an analysis of the sensitivity of the results to changes in the price of sugar is useful.

Figure 3 extends the break-even analysis, showing the break-even yield for treatment 2 at different sugar prices. The graph shows that at lower sugar prices, the reduced fertiliser treatment could sustain a greater decreases in yield before it became less profitable than the standard treatment.

Figure 3: Sensitivity of break-even yield to sugar price



Conclusion

This study examined the economic impact of applying a lower rate of fertiliser in late ratoon blocks.

The trial did not find evidence that reducing fertiliser rates resulted in lower production levels, while the fertiliser savings meant that the reduced rate treatment had a higher gross margin of $292 per hectare compared to the standard rate treatment.

Break-even analysis indicates that the reduced fertiliser rate could sustain a decrease in yield of 5.5 tonnes per hectare before becoming less profitable than the standard rate.

As the sugar price decreases, larger yield decreases in the reduced rate treatment could occur before becoming less profitable than the standard treatment.

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