GROWER CASE STUDY ON ECONOMICS OF AN IMPROVED FARMING SYSTEM

By

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Abstract

THERE HAS been a lot of research done by the Sugar Yield Decline Joint Venture providing insights and recommendations on how to improve the farming system to combat yield decline in cane fields. This paper explores a cane farming family's experience with implementing practices advocated by the SYDJV and describes the changes they have made to their farming system. This description includes the specific practices that they were using before implementing the recommendations, the changes they have made, and the economic, environmental and social impacts that these have had on their business. The new farming system includes controlled traffic, reduced tillage, peanut rotation, flood irrigation from new on-farm storage, with GPS technology linked to land levelling, planting, harvesting and fertiliser application. One significant finding was the changed farming system showed a return on investment on the old farming system of *minus* 10.8% improving to *plus* 5.9% for the new system. Cane gross margin per hectare on the old system was –$148 versus $1157 on the new system. The Loeskow family cannot stress enough the need to continually investigate improved farming practices and invest in new technology and equipment. A preparedness to continually change has been the key to the Loeskow family success.

Introduction

In recent years, growers have often been told that change is necessary in order to remain viable in their business. Cane farming is a business and change is inevitable, ongoing and challenging. Change means spending time and money, investing in new ideas, new technology and new equipment. In the 1970s, sugarcane yields were decreasing and in the early 1990s the Sugar Yield Decline Joint Venture (SYDJV) was formed to investigate the reasons for the yield decline. Reasons such as poor soil health, poor soil structure and outdated farming practices were identified (Garside *et al*., 2002, 2005). Years of monoculture resulted in a build up of harmful pathogens. Mismatched heavy harvest and haul-out equipment badly compacted about 90% of the field each year, and excessive tillage operations destroyed soil structure. A new farming system has been developed which has three main components—controlled traffic, minimum tillage and legume rotation crops. Growers also have had to become more efficient managers of their main resource, land, as

well as becoming better business managers. All operations have to be efficient, cost effective and timely.

Relmay Farms owned and run by the Loeskows made a major change to their farming system in 1992 by breaking the monoculture and introducing peanuts as a legume crop. Since then, they have moved to flood irrigation, controlled traffic, and reduced tillage. More recently, they have invested in global positioning systems (GPS) technology. In 1996, the decision was made to rake the trash into every second inter-row, doubling the trash in those inter-rows and leaving the other inter-rows free of trash. This was to facilitate effective water flow down the non-trash inter-row using the flood irrigation system as well as maintaining good drainage.

Farm description

The Loeskow farms produce cane on some of the most marginal coastal land in the region. Soils used for sugarcane production on the farm are generally classified as Mahogany, Alloway and Clayton (Donnollan *et al*., 1998). According to the Australian Soil Classification system, they are categorised as Redoxic Hydrosols (Isbell, 1996). These soils have generally poor natural fertility and structure. They have since been modified with the addition of clay and other ameliorants. The average block size is 20 hectares and row length is 450 metres. Most blocks are laser levelled to 1% grade. This ensures a constant flow and infiltration rate avoiding uneven watering. The farm has extensive drainage and tail-water recycling. Ninety-five percent of local run-off from rain events is caught in the drainage system and collected in the on-farm water storages.

Production history

This paper will focus on the difference in the farming systems between 1992 and 2005, but it is of interest to briefly look at production changes over a 60 year period.

- 1946—20 hectare farm with 8 hectares producing 90 tonnes of cane, a yield of 11tc/ha.
- 1986—total farm area 1435 ha with 228 ha developed and grew 16 000 tonnes of cane with a yield of 70 tc/ha.
- 1992—total farm area 1435 ha, 350 ha developed with 280 ha under cane yielding an average of 53 tc/ha.
- 2005—total farm 1500 ha with 943 ha under cane to produce in excess of 90 000 tonnes (a yield of 96 tc/ha), and 134 ha peanuts yielding a total of 700 t. Peanut area increased to 160 ha for 2006 harvest.

Major investments

In the late 1980s, the Loeskows realised that there was a great need to change due to the negative impact of poor sugar prices, rising input costs and declining yields. Some of the major changes to infrastructure included:

- $1.3 million investment in ring tank and change to flood irrigation from overhead irrigation which was costing four times as much for applied water per hectare.
- Developed a further 753 hectares of land. This involved tree clearing, land levelling, drainage, amelioration of nutrient deficiency and improving soil structure.
- Implementing a three metre controlled traffic farming system requiring the purchase of 3 metre centred twin row harvesters (x 2), 3 metre centred tractors for fertiliser application and spray operations.
- More recently $205 000 has been invested in GPS technology.

Economic analysis of old versus new

Economic analysis was conducted using the Farm Economic Analysis Tool (FEAT) (Cameron, 2005). The tool has been designed specifically for cane farmers to compare different farming systems. It enables growers to assess as accurately as possible the economic impact of a change before making on-ground changes.

The tool can make accurate comparisons because it is based on a lot of detail such as kilograms of fertiliser or chemicals applied per hectare. Machinery costs are based on detailed costings using tractor size, fuel consumption, implement speed, width, efficiency and repairs and maintenance.

FEAT can also be used to compare an historical farming system to the current farming system to give a reasonably accurate economic result of the changes. This is done by applying current input prices to both the current and historical farming practices. The same commodity price is applied to both farming systems.

In other words, this approach shows what the return on investment would be today, had the grower not made any changes.

In the case of Relmay farms, the size of the operation increased considerably between 1992 and 2005, so economic comparisons in the Table 1 are shown in per hectare, per tonne and percentage terms.

Without change, Relmay would have lost $148/ha gross margin at today's input costs and price of sugar at $300/t. This is regardless of scale of operation. The return would have been negative even before paying off fixed costs which include labour costs.

The low returns under the old system are largely due to low yield as well as higher growing costs. Under the current farming system, gross margin is now $1157/ha.

The amount invested in Relmay has increased 3.4 times from $4 542 000 to $15 500 000 in 2005 based on current market values. Had the Loeskows still been farming the same operation as they were in 1992, and paying today's input costs, the return on investment would have been *minus* 10.8%. Under the current farming system, the return is *plus* 5.9% and is projected to be 8.0% in 2006.

As can be seen in Table 1, the much improved return on investment has been from a combination of factors. Cane yield has increased from 53 t/ha to 96 t/ha. Cane growing costs have dropped from $1262/ha to $703/ha. Peanuts now contribute a significant amount of income with a gross margin of $2543/ha at a payment yield of 5.34 t/ha.

An important factor in the reduced costs under the current system is that tonnes grown per man per annum has increased more than eight fold from 1137 t to an impressive 15 084 t. Added to this, these same men look after 160 ha of peanuts, a crop that is far more demanding in labour terms. The number of hours spent on tractors in the cane operation has decreased dramatically from 15.12 h/ha to 1.12 h/ha.

Part of the reason for this is that 2.4 h/ha is spent on preparing the land for peanuts. The total amount of time spent on tractors for the peanut crop is 7.47 h/ha.

The number of men employed has been reduced from eight to six even though area of land under the plough has increased from 280 hectares to 1103 hectares (943 ha cane plus 160 ha peanuts for harvest in 2006).

In the Australian context of high labour costs, the efficient use of labour is particularly important.

While Table 1 shows the main economic indicators, more detail can be found in Tables 2 and 3 which show growing costs for cane and a gross margin analysis for peanuts respectively. Table 4 details the differences in farming practices between the two systems.

Table 1—Economic comparison of Relmay farming systems between 1992 and 2005.

	Old system (1992)	New system (2005)
Price per tonne sugar	$300/t	300/t
Average yield cane	53 t/ha	96 t/ha
Gross margin per hectare	$–148ha	$1157/ha
Gross margin per tonne cane	–$2.81	$12.06
Return on investment	–10.8%	+5.9%
Variable cost per tonne	$29.94	$13.23
Production per man per annum Cane Peanuts	 1837tc –	 15084tc 119t
Tractor labour h/ha cane	15.12 h	1.12 h*

* (2.4 h/ha in peanut land preparation reducing amount required for cane).

Table 2—Cost of cane growing per ha and per tonne.

	Old System		New System	
	$		$	
	Per ha	Per tonne	Per ha	Per tonne
Land preparation	75	1.43	4	.04
Planting	209	3.99	78	.81
Fertiliser	432	8.21	383	3.99
Weed control	90	1.71	123	1.28
Insect control	52	.99	9	.09
Disease control	6	.12	6	.07
Irrigation	398	7.59	100	1.04
Total Growing Costs	1262	24.04	703	7.33

Table 3—Peanut gross margin (2005).

Price	$897/t
Payment yield	5.34 t/ha
	$
Gross income	4790
Expenses	
Land preparation	164
Planting	444
Fertiliser	666
Weed control	146
Disease control	234
Irrigation	100
Harvesting & drying	334
Freight	159
Total expenses	2247
Gross margin	2543

Benefits of new over old farming system

Controlled traffic system

- Substantial improvements in efficiency due to increased speed and width of pass leading to reduced input costs.
- Significant reduction in percentage of area compacted. Reduced compaction leads to improved soil health and plant growth.
- Improved water infiltration due to reduced compaction and thus yield improvement.
- Provides the potential to extend the number of ratoons.

GPS

- Ensures the accuracy of controlled traffic thus enhancing all the benefits of controlled traffic and precision farming.
- No overlap leading to more efficient coverage with fuel, oil, repairs and maintenance being reduced by at least 10%.
- Reduced chemical usage by at least 10%.
- Reduced stress for grower and employees due to not having to concentrate on driving as well as monitoring the equipment.
- Possibility of night time operations thus spreading the investment cost further. There is the added advantage of working when the air temperature is cooler for the driver and machines.

Peanuts in rotation

- Income—high gross margin especially with seed grade contract.
- Improved soil health—reduction of pathogens and increased microbe and earthworm populations.
- Improved soil tilth for the following cane crops leading to improved water infiltration and aeration, reduced harvester damage to stool.
- Potential to increase number of ratoons in cycle.
- Improvement in yield of the cane and thus profitability.
- Peanuts provide 60 kg/ha of nitrogen for the plant crop.
- Only necessary to rip once after peanuts before plant cane.

Table 4—Practice differences between old and new farming systems.

	Old system (1992)	New System (2005)
Cropping	Spring plant with bare fallow	Autumn plant cane in rotation with peanuts
Land preparation	2 x offset discs	Peanut land preparation
	2 x disc plough	2 x discs
	2 x rotary hoe	1 x ripper
	1 x land plane	1 x square plough
	1 x ripper	1 x laser bucket
	1 x marking out	1 x ripper
		1 x 8 row bed former
		Cane land preparation
		1 x ripper
Row spacing	1.5 m	2 x 1.5 (3 m system)
GPS	None	GPS
Fertiliser (plant)	DAP, CK 50/50 S	Special mix with micronutrients, CK 50/50
Fertiliser (ratoon)	CK 140(S), Urea	CK 140(S) applied in two applications.
Weed control	Cotton King plus chemical	Chemical using hooded sprayer— more efficient
Insect control	Temik (nematodes)	Nil because peanuts in rotation
Irrigation method	Over-head with high [1]R&M	Flood—low electricity and low R&M
Irrigation – amount	4 ML/ha	4 to 5 ML/ha
Trash blanket	Burnt cane, trash blanket	Green cut, trash blanket raked into every second inter-row for controlled traffic and drainage

[1]repairs and maintenance

Economic benefits

All the benefits above result in either improved productivity or reduced input costs leading to improved profitability and sustainability.

Environmental benefits

- Reduced fuel usage and the attendant effect on air pollution and global warming (as sought by Kyoto protocol).
- Reduced potential for nitrogen and phosphorus run off because of improved soil structure.
- Improved soil health and reduced erosion of soils.

Social benefits of changed farming system

- Although the management team has a much larger farming operation, they are farming with less effort today than they were in the early 1990s. The changed economic circumstances of a much reduced debt and good return on investment, provides them with a great sense of achievement. Neville Loeskow is extremely proud of the achievements of his son, Jason, and sees a very bright future for him.
- Management and workforce have the added interest of a more challenging crop than cane, peanuts.
- With the introduction of GPS into the farming system, operator stress levels are much reduced and they now have the satisfaction of seeing work done with a high degree of accuracy.

Secrets to success

- Acknowledging the need to change continually to remain profitable and sustainable.
- Attention to detail—e.g. calibrating equipment regularly and properly. In one example, the fertiliser used was only 7 kg (or 0.001%) below the amount budgeted.
- 'Near enough is not good enough' attitude.
- Excellent communication between partners and employees.
- The mutual respect that exists between family members, especially between generations, has produced very positive results. For example when GPS was initially purchased, Neville Loeskow was uncertain as to its worth and place, but is now convinced that no future farming operation can exist without GPS assistance.
- Judicious investment in technology and inputs – eg purchase peanut harvester.
- 'State of the art' farm machinery.
- Maximising use of resources. For example, the main tractors do no less than 600 hours per tractor per year.
- Very professional operation – 'Taking control of chance.'
- One of Neville Loeskow's mottos is .He who fails to plan, plans to fail.'
- Looking to other industries and areas for ideas, e.g. cotton growers in Western Queensland.
- Avoiding confrontation in all aspects of life.
- Strong and fair with employees, knowing their strengths and weaknesses. The shortest serving (and youngest) employee has been with them for 11 years

- Ensured an adequate water supply by investing in a 3000 ML ring tank on-farm storage.
- Doing everything on time—irrigate before the crop stresses. They prefer to waste electricity and water in the event it does rain, rather than allowing the crop to stress if it does not rain.
- Attitude that 'there is no such thing as standing still,'
- The Loeskows are good farmers and good businessmen. Neville Loeskow believes that farmers are made not born and need to develop good business skills.

Where to from here?

By 1st June 2006, the Loeskows propose to have total controlled traffic on 3 metre centres for all farm operations under their control (both peanuts and cane). The only operation not on 3 m centres will be cane in-field haulouts. However, these units only have one pass over ground with the 2-row cane harvester. The plan is for the contractor to purchase 3 m centered in-field haulouts some time in the next two to five years. This will be a major investment of around $1 million for three units.

The projected cane production for 2006 is 103 700 tonnes with an average yield across the farm of 110 t/ha. At $300/t for sugar this will provide a return on investment of 8.0% based on a cane gross margin per ha of $1429. The outlook for sugar price is better than $300/t but this figure is used to make a fair comparison between 1992, 2005 and 2006.

The Loeskows are convinced they should be harvesting all of the cane from their poorer soils two weeks earlier at the start of the season than is the current practice to maximise CCS and therefore returns. If this could be successfully negotiated, it would be a win-win for the industry.

Conclusion

The economic analysis clearly shows that had the Loeskows not had the vision and commitment to make the required changes, they would not be in the cane farming business today. While the scale of this operation is considered larger than average, the principles demonstrated by the Loeskows can be readily embraced by the cane growing industry at large. New farming system practices of controlled traffic, minimum tillage and legume rotations along with good planning, timeliness of operations, and attention to detail along the way are not restricted to large scale operations. Indeed for the long-term survival of the industry, these principles and practices need to be applied to every farming venture.

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