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Editorial...

S

O here we are again with rain holding up the harvesters and disrupting crushing operations. And we are not alone – the Kingsman estimate for Brazil’s centre-south sugar output has been reduced because of persistent wet weather which has lowered sugar levels and delayed crushing – sound familiar?

Meanwhile in India their sugar production is likely to fall because of inadequate rainfall. This would follow two consecutive years of bumper harvest that turned India into a sugar exporter. If there is a decline in Indian exports this could help to shore up global sugar prices. And good prices would be nice if we can produce some good sugar.

Good prices aren’t as big a worry for US sugarcane farmers in particular, and for many US farmers in general. The battle is on again in the US Congress to retain the farm bill renewing the decades-old sugar program. The Senate has already voted down efforts to repeal or roll back the program.

Under the program, at least 85 per cent of sugar sold in the US must come from domestic processors. The US Department of Agriculture tells sugar companies how much they can sell and limits how much low-tariff sugar can be imported from overseas.

The government can also buy up excess sugar and sell it to ethanol makers – even at a loss – to avoid price slumps. US sugar producers are guaranteed minimum prices through federal loans that allow them to borrow against their sugar supplies at a specific per-pound rate. If market prices drop below the specified price, producers can forfeit the sugar instead of repaying the loans in cash.

Supporters of the program contend that the program provides safe, American-made sugar at little cost to taxpayers. I suspect we could provide safe Australian-made sugar at even less cost to the US taxpayer!

But wait, there’s more. The USDA gave nearly $3 million last year to 2327 farms that had not grown any crops since 2006, according to a recent report from the US Government Accountability Office (GAO). Of those farms, 622 had not grown any crops since 2001.

According to GAO’s analysis, about 2300 farms reported all their land as ‘fallow’ – producers did not plant any crops of any type on the land – for each year of the last five years as allowed under the farm bill.

While some farms were receiving subsidies without actually growing crops, others got billions even though they didn’t grow the crops for which they were being subsidised!

The GAO perhaps not surprisingly concluded that: “In light of the need to identify potential savings in the federal budget and questions about the continued need for direct payments, Congress should consider eliminating or reducing direct subsidy payments.”

The GAO also recommended enhanced screening techniques to weed out non-farm land from subsidy programs. The USDA accepted some of those recommendations, but rejected a proposal to gather more data that might conceivably establish that farms that benefit from federal subsidies are actually still in operation.

As you are well aware sugarcane farmers in Australia are also being asked to consider some important data. In early August, all cane farmers will receive papers from the Australian Electoral Commission to vote in the Sugar Poll 2012.

This poll could see the end of both BSES and the Sugar Research and Development Corporation and the emergence of a new entity to be called Sugar Research Australia.

We all have a vested interest in seeing world quality research continuing to underpin and drive our industry. I urge you to consider carefully all of the arguments being put forward.

In this issue...

First carbon dioxide now nitrous oxide

While traditional greenhouse gas emissions research has focused on carbon dioxide (CO₂) data on nitrous oxide (N₂O) soil emissions shows N₂O is effectively 300 times more potent than CO₂ when it comes to global warming.

See articles starting .......... Page 4

High-tech sensor targets weeds

Weeds are the bane of farmers and industry. They cost tens of millions of dollars in control measures, and tanker loads of chemicals are spread across farming land in the process. But a group of engineers in Toowoomba is turning this around.

See article ................... Page 11

‘HP’ – what does it mean?

Recently I asked a diverse group of individuals to tell me the first thought that comes to mind when they hear the initials ‘HP’. A rather frivolous request you may think. But have faith in this scribe – there was an intellectual purpose behind this somewhat curious request.

See article .................... Page 23
The newly registered solution for control of nutgrass in plant and ratoon cane.
While traditional greenhouse gas emissions research has focused on carbon dioxide (CO₂), data on nitrous oxide (N₂O) soil emissions from Australian soils is limited. And according to Professor Peter Grace from Queensland University of Technology, N₂O is effectively 300 times more potent than CO₂ when it comes to global warming.

Peter who heads Australia’s Farming Future Nitrous Oxide Research Program (NORP) says that is why NORP is so important. “The program brings together researchers who can measure and model N₂O emissions for dryland and irrigated farming (particularly grains, cotton, sugarcane and dairy) from sites right across the country. N₂O is a good indicator of overall nitrogen use efficiency, so the research outcomes are a win-win in terms of reducing emissions and increasing profitability.

“We want to develop a range of tools and specific management techniques for each individual land-use type and climatic condition. Farmers and others can use these resources to manage, and hopefully reduce, these potent emissions as well as improving nitrogen use efficiency.”

Agriculture a major source

N₂O is emitted naturally from the microbial processes in the soil – but the majority of N₂O emissions come from human activities, with much of this resulting from agriculture. N₂O research is being conducted at six core field sites including Mackay and Kingsthorpe in Queensland, Tamworth in New South Wales, Hamilton and Terang in Victoria and at Wongan Hills in Western Australia.

This spread is important as N₂O emissions greatly vary depending on the environment and industry, ranging from from less than 0.03 kg N/ha/day in the coarse textured dryland cropping soils of the Western Australian wheat belt to up to 1 kg N/ha/day from fertile soils of south-eastern Victoria under dairy production.

Sugarcane soils are high emitters

N₂O emissions from Australian sugarcane soils are also considerably higher than other cropping systems. It is thought that this is due to the amount of trash retained in the system and the fact that N₂O losses are higher when there is a lot of water in the system.

“The results in northern trials indicate that N₂O emissions seem to spike directly after irrigation. When you apply water, whether it is in the form of irrigation or just a higher rainfall zone, there is a greater potential for water logging,” Peter said. “When certain microbes are starved of oxygen, they look for alternative forms of energy, which leads to a faster rate of breakdown and an increased potential for gaseous losses of...
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While these four areas are of high priority, there remains a limited amount of funds for high quality innovative proposals in other areas of interest, including: plant genetics, pest control, enhancing the value of existing products, transport efficiency, positioning industry as a leader in environmental responsibility, waste minimisation and utilisation, preparing for a global environment with different resource availability and values, innovation skills, leadership and decision making skilling, business practices and value chain improvements, and extension and adoption of research.

Successful projects are expected to contribute to triple bottom line benefits and a high return to industry and government on research, development and extension investment.

Expressions of Interest for funding of research projects must be submitted by email to apply@srdc.gov.au by 17 August 2012.

SRDC is also calling for project proposals for Grower Group Innovation Projects and Capacity Building Projects, to be submitted by 31 August 2012.

For application details and instructions on how to submit an Expression of Interest or project proposal visit www.srdc.gov.au or ph: (07) 3210 0495.

**Wheat and cotton**

Trials conducted in Kingsthorpe on the Darling Downs have compared N\(_2\)O emissions in wheat and cotton crops under dryland and irrigated conditions. N\(_2\)O emissions in wheat trials ranged from 0.23 per cent (of the total nitrogen fertiliser applied) under dryland conditions to 0.38 per cent under full irrigation. A similar range in emissions was found in the cotton trials.

Irrigated cotton farming systems have previously been labelled high-risk agricultural systems with respect to gaseous losses of nitrogen, due to their heavy reliance on nitrogenous fertilisers and irrigation to maintain production levels.

“Our field data suggests that cotton and dryland cereal production systems are actually low emitters of N\(_2\)O, because those cropping systems do not return large amounts of residue and the soil carbon stocks have declined,” Peter said. “While these are relatively small numbers in terms of N\(_2\)O, they indicate there could be potentially larger emissions of nitrogen compounds, which are not greenhouse gases but still have a major impact on nitrogen use efficiency and profitability.”

With the development of the Carbon Farming Initiative, farmers are trying to retain more carbon in their soils, which then means there is an increased potential for N\(_2\)O emissions. But Peter maintains there are a range of management techniques that cotton farmers and other farmers more generally, can adopt to reduce N\(_2\)O emissions from agricultural soils.

“For example, splitting applications of nitrogen fertiliser and increasing irrigation water use efficiency is increasing across the cotton industry and its positive impact on reducing emissions is obvious,” he said. “Changing the type and amount of nitrogenous fertiliser that they apply to their soil may also help reduce potential losses.”

**Dairying**

Chemicals such as Dicyandiamide (DCD) are being used in dairy systems to inhibit N\(_2\)O production and the results are promising. Trials in the high rainfall zone of Victoria indicate applying DCD to the pastures surface can result in reductions of nitrous oxide of between 35 and 45 per cent and trials of Entec (DMPP) slow-release nitrogen fertilisers in crops in the northern grain region have cut N\(_2\)O losses from fertiliser by up to 90 per cent.

**Practical strategies to reduce nitrous oxide losses**

Planting legumes, reducing nitrogen fertiliser inputs to match crop demand and improving irrigation practices are all practical strategies farmers can implement to reduce N\(_2\)O losses.

“Australia has a great diversity of soils, a variable climate and vastly different management strategies between regions. That’s why the research is vital if we are to develop evidenced-based mitigation strategies to reduce N\(_2\)O and at the same time increase nitrogen use efficiency and profitability,” Peter said.

For further information on the CCRP or any of the funded projects, please phone 1800 638 746 or visit www.daff.gov.au/aff

This case study is part of a series produced by the Department of Agriculture, Fisheries and Forestry as part of the Climate Change Research Program.
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Soybeans to help cane farmers reduce greenhouse gas emissions?

Growing soybeans in rotation with sugarcane could reduce nitrogen fertiliser usage and potentially help Australian sugarcane growers minimise their greenhouse footprint.

Nitrous oxide (N₂O) is 310 times more potent than carbon dioxide, thus posing a bigger threat to the agricultural industry due to its global warming potential.

N₂O gas is emitted naturally from the microbial processes in the soil, but additions of nitrogenous fertilisers can increase the total mineral nitrogen content in soil, which in turn increases the rate at which bacteria release N₂O.

The Nitrous Oxide Research Program (NORP) was part of the Australian Government’s Climate Change Research Program – a significant research effort to provide practical solutions for agriculture to adapt and respond to a changing climate.

The research is a collaboration between DAFF, the Grains Research and Development Corporation (GRDC), the Queensland Department of Science, Information Technology, Innovation and the Arts (DSITIA), and BSES Limited.

Dr Weijin Wang, from DSITIA, said the project is investigating which strategies can help farmers mitigate nitrous oxide losses in sugarcane lands.

“Growing soybeans could considerably reduce the amount of nitrogen fertiliser needed in the system, thus reducing associated greenhouse gas emissions,” Weijin said.

He said the trials conducted in Mackay, Queensland showed that growing soybeans during the fallow period contributed about 110 kg N/ha into the soil, reducing the need for added nitrogen in the form of nitrogen fertiliser. This could ultimately save the grower money.

The findings are particularly pertinent as research also confirmed that nitrous oxide emissions from sugarcane soils can be higher than those associated with many other cropping systems, according to Weijin.

Weijin said this may be due to climatic and environmental conditions in sugarcane growing regions.

“Trials at Mackay indicate that nitrous oxide losses are higher when the soil is wet,” he said. “When water is added, whether it is in the form of irrigation or just higher rainfall, air and oxygen in the soil pores are displaced.

“When the microbes are starved of oxygen, they start attacking the nitrogen, which leads to a faster rate of breakdown and an increased potential for gaseous losses.”

The research team will continue to investigate optimum soybean residue management practices that reduce N₂O emissions whilst increasing nitrogen use efficiency by the sugarcane crop.

For more information phone (02) 6766 5222.

This case study is part of a series produced by the Department of Agriculture, Fisheries and Forestry as part of the Climate Change Research Program.
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Plants get full and save nitrogen for a rainy day?

A RESEARCH team in Montpellier, working in collaboration with teams from Strasbourg and New York University, have recently achieved a major advance in our understanding of plant nutrition. They have identified a gene involved in a molecular mechanism that can adjust the uptake of soil nitrogen by roots as a function of the nitrogen requirements of the whole plant. This research may help us select varieties displaying a more efficient use of nitrate fertilisers, so as to ensure more environmentally-friendly crops.

To ensure their nutrition, plants absorb soil nitrate, or NO$_3$ (the principal source of nitrogen for herbaceous plants) via their roots. This is done by a highly efficient ‘transporter’ medium that is produced in the roots. The transporter allows the passage of nitrate through the membranes of cells at the periphery of the root.

But because soil nitrate availability can fluctuate over time and in space, plants must constantly adjust their absorption capacity so as to maintain a sufficient nitrate intake that will meet their needs.

This is facilitated by a mechanism known as ‘satiety’ (being replete or full), that allows the plant to reduce its absorption when its nitrogen requirements have been met.

For the first time, researchers in Montpellier have identified a gene (HNI9/IVS1) that participates in this mechanism in the model plant Arabidopsis thaliana. This gene links to a nuclear protein in plant cells, the function of which had been very poorly understood until now.

The scientists have shown that when the plant is satiated – had enough nitrogen – this protein causes the deposit of markers in the gene of the principal membrane transporter of root NO$_3$. These markers do not modify the gene sequence but act as a ‘modulator’ of its expression – this slows down the production of the transporter. The quantity of the transporter thus diminishes, and root nitrogen absorption is reduced.

This original research could well lead to the more efficient use of fertilisers in agriculture. Indeed, nitrate is one of the principal ingredients in these fertilisers, and applied fertiliser that is not taken up by crops can pollute ground and surface water.

The discovery of mechanisms that are naturally implemented by plants to adjust nitrate uptake to their nutritional requirements, is of particular interest and potentially of real importance.

One of the long-term prospects is to breed plants capable of accumulating nitrogen even when their immediate nutritional requirements are met, so that they can remobilise it at a later stage. This could improve soil nitrate use efficiency by plants and allow a reduction in fertiliser inputs in agriculture.

Contact: Marc Lepetit; INRA-CNRS-SupAgro-Université Montpellier – Biochemistry and Plant Molecular Physiology. Email: lepetit@supagro.inra.fr

Can we breed plants capable of accumulating nitrogen through their roots even when their immediate nutritional requirements are met, so that they can remobilise it at a later stage.
High-tech sensor targets weeds for zapping

By Miles Noller for NCEA, USQ

WEEDEDS are the bane of farmers and industry. They cost tens of millions of dollars in control measures, and tanker loads of chemicals are spread across farming land in the process. But a group of engineers in Toowoomba is turning this around. They are developing new sensing systems to identify and target hard to kill weeds.

It’s all part of a series of projects that are developing a machine recognition system so weeds in the crop row can be identified and spot sprayed with herbicide.

The work is being done by the National Centre for Engineering in Agriculture at Toowoomba’s University of Southern Queensland. Contributing to the development are research engineers Steve Rees and Dr Cheryl McCarthy.

**Machine vision**

Machine vision weed spot spraying systems have been around for a decade or so, although commercial units are not designed for detecting weeds amongst growing crop.

Steve Rees said the current work commenced about 2006 with a project for spot spraying problem weeds in sugar cane rows.

“This project rolled into a second project in 2010, with the support of the Sugar Research and Development Corporation,” Steve said. “It is to be completed next year and aims to identify guinea grass, green panic, and sorghum in sugar cane rows.”

**Spotting green weeds in green cane**

The project is using image analysis to identify “green from green”. As Steve put it – “we are picking green weed plants out of green cane rows.”

This is being achieved with the use of video and theatre-type lighting units which are mounted under a cover over, or adjacent to, the sugar cane row.

The image equipment can be towed or mounted on a tractor toolbar and can be used until the sugar cane reaches the tractor clearance height.

“We want to analyse the plants in the row in real time, and we are looking for the colour, texture and shape of the plants from the image analysis.”

Green panic for instance has a lighter colour than sugar cane, and guinea grass at this stage of growth is similar in colour. And when identified, the plant is spot sprayed with a jet of herbicide.

**Tested on different soils, different stubble**

Dr Cheryl McCarthy said the project was going well, and its effectiveness was also being tested on different soil types and with different stubble cover (a trash blanket covered the soil in a crop of ratoon cane). The colour analysis equipment allowed the filtering-out of the background.

Trials are underway at a Bundaberg Sugar farm at Fairymead.

NCEA research engineers Steve Rees and Cheryl McCarthy.
“The Sugar Research and Development Corporation will be looking for a working prototype machine from the project,” Steve said.

A number of technologies are being used to find the most efficient method of identifying weeds. Other research has looked at spectral analysis of the weed plants, to identify specific weeds in a fallow situation and from that characteristics were identified. The research is also looking at:

■ Active triangulation, applying patterns of light and using a camera to determine the shape of the plant;
■ Using the combined images of RGB and near infrared to identify weeds; and,
■ The use of 3D and colour was also being applied.

Some of this work is also being undertaken for the Rural Industries Research and Development Corporation (RIRDC) which is seeking a system that discriminates weed species found across a number of farming industries.

Reducing glyphosate resistance

Such a system would reduce the occurrence of glyphosate resistance, and also reduce herbicide use, reduce the potential for damage from spray drift, and the possibility of herbicide getting into nearby streams, extend the effective life of traditional chemicals, and support minimum tillage and new farming systems.

Integrated Weed Management is being promoted by research and development corporations as a way to counter glyphosate resistant weeds, and the current research should allow not only the identification of weeds but also the mapping of these weeds, allowing the farmer to see if weed areas were reducing or getting bigger.

The NCEA researchers are also developing new technology for the Tasmanian pyrethrum industry where Botanical Resources Australia also needs a machine to identify weeds and target them with herbicide.

Contact: National Centre for Engineering in Agriculture; University of Southern Queensland, Toowoomba. Phone 07 4631 1871.

FIGURE 1: The sugar image analysis software that allows the machine to identify weeds in crop
A

n analogy to plastic surgery for a centre pivot refit might sound like an outlandish description but essentially it was just a bit of simple (although still reasonably pricey) adjustments that corrected and restored the functions of this ‘old girl’ and gave her a new lease on life.

The ‘Struanville’ irrigation team, consisting of Rob Carter and his son-in-laws, Matt Finch and Scott Smith, acquired the ‘old girl’ when Rob purchased an adjacent farm in October 2009. The 1983 model was showing her age and exposure to bore water with a high salt content over time had left the machine under performing.

Matt and Scott, determined to give her another go, attended a More Profit per Drop (MPPD) Centre Pivot/Lateral Move Training course. From this they corrected sprinkler placement and fixed dropper lengths where needed. While the pair were happy to continue this gradual servicing they suspected the ‘old girl’ had bigger issues. They decided to get an outside opinion and spoke to Dalby extension officer Jenelle Hare.

Jenelle organised an initial assessment with the MPPD team, and Pat Daley of Daley Water Services with assistance from the ‘Struanville’ team. The initial assessment conducted in November 2011, according to procedures set out by the American Society of Agricultural Engineers Standard 436.1, revealed the ‘old girl’ was 72 per cent efficient.

This was not surprising given the obvious misgivings of the machine, notably:

- Uneven dropper lengths;
- Incorrect sprinkler placement;
- Water pooling in low spots;
- Uneven application across machine (ranging from 0 to 74 mm);
- Insufficient pressure at end of machine; and,
- Water pooling around tyres.

Pat Daley prepared a report for the ‘Struanville’ team concluding with prioritised recommendations for rejuvenating the centre pivot.

The ‘Struanville’ team had to decide whether to spend money on refitting the machine or do away with it. But who has the money to just replace a machine? So the ‘Struanville’ team shopped around and decided to start off by completing the first of Pat’s recommendations which included:

- Installing a new sprinkler package with 15 psi regulators; and,
- Fitting spreader bars on the overhang and last four towers (two bars on each side of the wheels).

Matt and Scott completed the minor procedures over a
period of approximately three days and were pleased with the results. The MPPD team and Pat Daley reassessed the machine on January 10, 2012 and determined the ‘old girl’ was now operating at a respectable 92 per cent uniformity (an improvement of 18 per cent).

So what is the benefit of improving uniformity – it is not just cosmetic. Uniform irrigation will lead to better crop performance from a given water allocation and more efficient energy use. The cotton crop which had been replanted shortly before the first assessment, at the second assessment looked good although patchy in a low spot of the field. There had been some concern that the crop may not establish well due to the non-uniform irrigation it initially received. Rain received in early summer assisted establishment. Without rain and without the improvement in the system uniformity the crop may have struggled. Hence the ‘Struanville’ team believe it was money well spent on the machine as they hope to achieve better yields in future with more efficient use of their water and energy resources.

Interestingly the pivot is operated as a half circle at any given time. Cotton is grown in summer on one half of the circle and a winter crop on the other half. The ‘Struanville’ team manage the pivot like this to ensure adequate system capacity is available for the crop from the machine and to provide flexibility with decisions in regard to water available.

Another of Pat Daley’s recommendations which the ‘Struanville’ team is implementing is to fit a manual brush type filter at the pivot tower. Pat emphasises “that a filter is a must for this kind of machine using surface water.”

In the future, the ‘Struanville’ team think that the pump which supplies the pivot will be where they focus their attention as issues were also identified with the pump during the initial assessment of the centre pivot. But in the mean time they will now enjoy irrigating with the ‘rejuvenated girl’. 

74% uniformity.

92% uniformity.
Can we make savings on irrigation costs?

With water and power prices going up and a carbon tax coming down can we make savings on irrigation costs? Work undertaken by the National Centre for Engineering in Agriculture (NCEA) studied direct on-farm energy use across a number of industries and crops including sugarcane to understand the range, costs and contributions of energy use to crop production and greenhouse gas (GHG) emissions.

For sugarcane, this work has identified significant savings in energy and GHGs for both a refinement in practices (such as up to 30 per cent for irrigation) and a change in practice (up to 20 per cent in plant cane through minimum tillage) through energy assessments. This equated to potential savings in energy costs of $30 to $100 per hectare.

A number of energy use farm case studies revealed that the most significant use of energy within the farming enterprises was irrigation.

In general, irrigation accounted for more than 60 per cent of the total direct energy use on-farm. This means that delivering energy savings focused on irrigation is likely to have considerable impact.

**Ten pump installations evaluated**

A number of irrigation system performance evaluations were undertaken including an assessment of 10 pumping installations in various locations including Mackay, Bundaberg and Isis districts.

Both pump efficiency and pumping costs were calculated for each of these installations and based on information obtained from these sites by monitoring the pump flow rate, total dynamic head of the pump and energy use (litres of diesel; kWh of electricity).

Information was also collected on energy costs ($/litre of fuel; $ per kWh of electricity) and other pump details were recorded including, engine/motor size, transmission/drive type.

The tests revealed relatively low pump efficiencies and therefore significant opportunities for improvement. Pump performance tests were conducted to examine the energy efficiency of pressurised irrigation systems included three centre pivots, one lateral move, five travelling guns and one travelling boom. A summary of these results is presented in the Table below.

The pump efficiency at these sites ranged from 55 to 71 per cent while pumping costs ranged from 43 to 62 c/ML/m head. There was no distinction between the performances of high or low pressure irrigation systems with pump efficiencies in all but one case being lower than 70 per cent.

High pressure irrigation systems including the five travelling guns had pump efficiencies ranging from 55.0 to 68.8 per cent. Pumping costs ranged from $34.62/ML to $46.40/ML and from 48 to 62 c/ML/m head.

Low pressure irrigation systems including the two centre pivots, the lateral move and the travelling boom also had similar performance to the high pressure systems.

Pump efficiencies ranged from 57 to 71 per cent while pumping costs ranged from $34.62/ML to $46.40/ML and 46 to 62 c/ML/m head. As a general guide farmers should aim for pumping costs of 43 c/ML/m head. Given a maximum cost of 62 c/ML/m head the results indicated potential savings of up to 30 per cent in irrigation energy could be achieved at some sites (30–40 $/ha).

**Achieving efficiencies**

Achieving high pump efficiencies requires a correctly designed and well maintained irrigation system. If the pump has been matched incorrectly with the system duty then high pump efficiencies are not achievable.

Similarly, a well selected pump will not continue to work at high pump efficiency if it is not maintained (cleaned, greased, etc.) and/or if it is working under harsh conditions (e.g. pumping gritty water). This is particularly important given irrigation represents a significant proportion of energy use on-farm.

This article has been drawn from a paper presented at the 34th ASSCT Conference by Craig Baillie and Guangnan Chen; NCEA USQ. Reference: Proc Aust Soc Sugar Cane Technol Vol 34 2012

Contact: Craig.Baillie@usq.edu.au

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GM crop report finds economic and environmental benefits

Farmers who grow GM crops continue to see significant economic and productivity gains, as well as improved incomes and reduced risk for their businesses, according to the latest annual report from PG Economics.

And it appears that Australian GM cotton and GM canola farmers have realised farm income benefits of more than $400 million over the 15 year period covered by the report.

“These significant benefits confirm that it is absolutely critical for Australian farmers to have access to all the available technologies in order to increase the productivity and environmental sustainability of their farming enterprises,” says CropLife Australia’s Chief Executive Officer, Matthew Cossey.

“GM crops are proving to be a critical tool for farmers globally as they meet food security demands in the face of global economic uncertainty and a changing climate.”

The key findings of this seventh annual report on crop biotechnology impacts are:

■ The net economic benefit at the farm level in 2010 was $14 billion, equal to an average increase in income of $100 per hectare. For the 15-year period (1996-2010), the global farm income gain has been $78.4 billion.

■ The insect resistant (IR) technology used in cotton and corn has consistently delivered the highest increase in farm income, especially in developing countries (notably cotton in India and China); the average farm income gains from using IR cotton and corn in 2010 were $284 and $89 per hectare respectively.

■ Of the total farm income benefit, 60 per cent ($46.8 billion) has been due to yield gains resulting from lower pest and weed pressure and improved genetics, with the balance arising from reductions in the cost of production. Three-quarters of the yield gain came from adoption of IR crops and the balance from herbicide tolerant (HT) crops.

■ The cost farmers paid for accessing crop biotechnology in 2010 was equal to 28 per cent of the total technology gains.

■ Between 1996 and 2010, crop biotechnology was responsible for an additional 97.5 million tonnes of soybeans and 159.4 million tonnes of corn. The technology has also contributed an extra 12.5 million tonnes of cotton lint and 6.1 million tonnes of canola.

■ If crop biotechnology had not been available to the (15.4 million) farmers using the technology in 2010, maintaining global production levels at the 2010 levels would have required additional plantings of 5.1 million ha of soybeans, 5.6 million ha of corn, 3 million ha of cotton and 0.35 million ha of canola. This total area requirement is equivalent to 8.6 per cent of the arable land in the US, 23 per cent of the arable land in Brazil or 25 per cent of the cereal area in the EU.

■ Crop biotechnology has contributed to significantly reducing the release of greenhouse gas emissions from agricultural practices. This results from less fuel use and additional soil carbon storage from reduced tillage with GM crops. In 2010, this was equivalent to removing 19.4 billion kg of carbon dioxide from the atmosphere or equal to removing 8.6 million cars from the road for one year.

■ Crop biotechnology has reduced pesticide spraying (1996–2010) by 438 million kg (~8.6 per cent), equal to the total amount of pesticide active ingredient applied to arable crops in the EU 27 for one and a half crop years. This has reduced the environmental impact associated with herbicide and insecticide use on the area planted to biotech crops by 17.9 per cent.

PG Economics Limited is a specialist provider of advisory and consultancy services to agriculture and other natural resource-based industries. Their specific areas of specialisation are plant biotechnology, agricultural production systems, agricultural markets and policy.

The full report can be downloaded from: http://www.pgeconomics.co.uk

FIGURE 1: Global biotech crop plantings by crop 1996–2010 (ha)
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GOLD COAST
Ross Inglis
07 5553 8914
AFTER five consecutive tough years, third generation farmer Matthew Dart decided to dramatically rethink the way his business had been operating.

A former bank agribusiness manager, Matthew joined his father, Peter, in full-time farming in 2002. The challenging seasons, a staggering increase in input costs and the pending deregulation of the wheat market demanded a business transformation.

“We reviewed the business and identified a number of needs to ensure survival and growth,” said Matthew. “We needed to increase the overall scale of our 3800 hectare operation in southwest New South Wales to reduce the fixed cost burden and improve efficiencies. Coupled with this, we needed to look at our succession planning. I’ve always said it’s family disputes that affect farms more than drought.

“We started to look at what was possible. During the course of our investigations, we spoke to David and Allison Burcham, close friends of ours who ran an 80 hectare irrigation property at Currawarna, 75 km south of Ariah Park.

“They were in a similar position, questioning how they could increase efficiency. They were also keen to maximise the potential of another business they were running, the Pioneer Promoter Agent franchise for the Murrumbidgee and Coleambally irrigation areas.”

“We identified a number of needs to ensure survival and growth.”

**Friends that share – business models included**

The friends developed a shared business model and, in late 2008, the DB Group was formed comprising Matthew and his wife, Samantha, David and Allison Burcham, and Matthew’s parents, Peter and Phyllis.

The business incorporated the three family farming businesses, including the Burchams’ Pioneer Promoter Agent franchise and the Darts’ retail business, Griffith Feed and Grain, which is run by Phyllis.

Each family retained the land they owned in their individual names. The DB Group leases the land from them. The DB Group owns the machinery and livestock, employs the labour and is responsible for growing and marketing the crops.

To maximise the returns from the machinery and personnel, they also run a contract sowing, spraying and harvesting business.

The DB Group now manages 11,580 hectares spread over 270 km. Land holdings include a 3200 hectare property at Binya, a 4000 hectare property at Merriwagga, a 1300 hectare property at Ariah Park, and an 80 hectare irrigated block at Currawarna. In addition, a 3000 hectare property at Ardlethan is managed under contract for a northern New South Wales family farming operation.

“The enterprise enabled us to increase our cropping area from 2500 to 8100 hectares. Having our crops being split between owned and managed land has allowed the group to reduce its financial risk in any one season. In addition, having the crops spread across a number of properties enables us to reduce seasonal risks such as rainfall fluctuation. We can also maximise our investment in machinery as it can be moved between properties due to a difference in crop maturity,” said Matthew. “Our dry-land cropping operation program ranges from...
oilsed and milling wheat to triticale. All crops are sown using
either minimum or zero till technology, with an emphasis on
maximising yields per effective millimetre of rainfall.”

As well as cropping, the DB Group runs 2500 Pollworth ewes,
a diversification strategy to offset the seasonal risks involved in
cropping.

“We’ve always had sheep to ensure diversification of income
streams. Since forming the DB Group, we’ve been able to
improve this side of the operation as well,” said Matthew.
“We used to feedlot the lambs at Aria Park, which is a time-
consuming task. Forming the DB Group has enabled us to
dedicate a 50 hectare irrigated block at Currawarna to lucerne,
which is where the lambs are finished off before market. We’re
turning off 2000 lambs annually, which, at current prices of in
excess of $150 per head, makes this a profitable arm of the
business.”

Convincing banks to take a risk!

The most difficult part of the business transformation, according
to Matthew, has been convincing the banks to take a risk.
“It’s a very different business model to most farming
enterprises. It took a lot of negotiating to get the banks
across the line. We kept pushing because we knew we had to
corporate the family farm to remain viable and survive. The
outcome is a business which will carry on regardless of changes.
Partner retirement, land sales or generational change can occur
without having a negative impact on its operational and future
viability.”

Peak machinery efficiency

Machinery choices are governed by a commitment to peak
efficiency.
“All of our equipment is set up with GPS and auto-steer
guidance, which assists us greatly in our current operation and
provides for further growth. I estimate the use of this technology
would easily allow us to manage up to another 3000 hectares,”
said Matthew.

The fleet includes a range of Case IH machinery from a
Steiger 375 which is used for sowing; to a Puma 165 tractor and
cVT model Puma 155, used for spraying.
“The Puma 165 and 155 are both medium frame tractors,
making them ideal for use in our operation,” said Matthew.
“They’re powerful enough to pull our 5000 litre, six tonne boom
spray with ease, but because they’re not as heavy as some of the
other tractors on the market, they don’t get bogged down in
wet conditions.”

The DB Group recently upgraded from a Case IH 7010 Axial-
Flow combine harvester to a 7120 Axial-Flow as part of their
three year machinery replacement cycle. With its 360 Hp (286
kW) engine and 55 Hp (41kW) power rise to get through tough
crop conditions, the header covers some 5500 hectares annually.
“Because our crops mature at different times, we are able to
use just one header across the entire operation,” Matthew said.
“As part of our business strategy, regular upgrading is vital. It
helps to avoid breakdowns and therefore expensive production
losses. When it comes to choosing the right equipment the key
factor for us is service, which is why we always go through the
Case IH dealer, Intersales, at Temora.”

Drawn from Farm Forum.

WORLD DEMAND FOR
AGRICULTURAL EQUIPMENT

A recent study analyses the world agricultural equipment
industry. It presents historical demand data and makes forecasts
for 2016 and 2021 by type, world region and major country.

According to the study world demand for agricultural
equipment is expected to increase 6.7 per cent per year
through 2016 to $173.5 billion.

Agricultural machinery demand in the Asia/Pacific region
was more than twice that of any other region in 2011. China
and India will be the primary nations fueling future market
advances in this region, although other smaller markets,
including Thailand and Indonesia, will also expand rapidly.

The Central and South America region will post strong
sales gains through 2016 as well, powered by growth in Brazil
and other countries with large, increasingly mechanised
agricultural sectors, including Argentina.

China to overtake US

In 2011, the United States held a slight lead over China
as the largest producer of farm machinery, with industry
shipments of US$23.1 billion. But the Chinese agricultural
equipment manufacturing industry is expected to expand
rapidly through 2016, while production growth in the United
States will be more moderate.

As a result, China will overtake the US to become the biggest
manufacturer of farm machinery in the world, with 2016
industry shipments 70 per cent greater than those of the US.

In the industrialised world demand will be driven by
technological advances, as the efficiency gains afforded by
newer equipment with more sophisticated technology will
make it economically feasible for farmers to replace their
machinery more frequently.

Replacement cycle generally eight or nine years

Since the average replacement cycle is generally eight or
nine years, high demand in 2011 means many farmers may not
replace machinery in 2016, constraining agricultural equipment
demand through the forecast period.

Farm tractors – the largest product segment in 2011 –
represented 30 per cent of all agricultural machinery sales.
Ploughing and cultivating machinery is expected to be the
fastest growing product type from 2011 to 2016, expanding
9.1 per cent per year as farmers in developing nations purchase
larger and more complex tilling equipment to in-crease the
productivity of their land.

World Agricultural Equipment to 2016 published by the Freedonia Group
and available at www.reportsnreports.com

The DB Group crops canola, wheat and triticale; runs
Pollworth ewes and fattens lambs on irrigated lucerne
pasture; and, operates two off-farm businesses.
Lower sugar prices in 2012–13

The world indicator price for raw sugar (Intercontinental Exchange, nearby futures, no. 11 contract) is forecast to decline by around 11 per cent in 2012–13 to average US20 cents a pound (October to September). The forecast price decline reflects large closing stocks in 2011–12 and a forecast of record world production in 2012–13.

While the world sugar indicator price is forecast to decline, it will still be favourable and well above US11.4 cents a pound, the average over the 10 years to 2008–09.

In 2011–12, the world indicator price for raw sugar is estimated to average US22.5 cents a pound compared with US27 cents a pound in 2010–11. As at 12 June 2012, the daily world sugar indicator price was US20.4 cents a pound.

Record world sugar production in 2012–13

World sugar production is forecast to increase by two million tonnes in 2012–13 to a record 178 million tonnes in response to favourable world sugar prices. Increased production of sugar cane is forecast for Brazil, China, India, Mexico, Australia and the US.
cane and sugar beet is forecast to increase by four per cent and 15 per cent to 1.8 million hectares and 300,000 hectares, respectively, in response to favourable prices that have given sugar favourable margins compared with production alternatives, such as corn, rice and cassava. Additionally, this season the sugar and beet mill operators in China provided free or subsidised seed and fertiliser, tractors and irrigation equipment to encourage producers to increase the planted area. The area planted to sugar cane is the largest since 2007–08 and area planted to sugar beet is the largest since 2009–10.

**Thailand**

Sugar production in Thailand is forecast to remain largely unchanged at around 10.6 million tonnes in 2012–13. A small expansion in the area planted to sugar cane is forecast as a result of government support programs and favourable market returns compared with production alternatives, such as cassava. But the effect on production is expected to be minimal.

**United States**

US sugar production is forecast to increase by 300,000 tonnes in 2012–13 to 7.8 million tonnes, driven mainly by an increase in sugar beet production. The forecast increase in sugar beet production is expected to be driven by favourable returns compared with production alternatives and higher yields achieved with genetically modified varieties. Sugar beet production comprises nearly 60 per cent of total US sugar production.

**Europe**

Sugar production in Europe is forecast to decrease by around seven per cent in 2012–13 to 28.2 million tonnes, driven by a return to average yields after the bumper yields achieved in 2011–12. In the European Union, sugar production is forecast to decrease by 1.2 million tonnes to 16.7 million tonnes. Outside the European Union, sugar production is also forecast to fall, with declines of 500,000 tonnes and 300,000 tonnes expected in the Russian Federation and Ukraine, respectively. The area planted to sugar beet is estimated to have declined by 8 per cent in the Russian Federation and by five per cent in Ukraine because of adverse planting conditions.

**Lower prices to boost world sugar consumption**

World sugar consumption is forecast to grow by 2.5 per cent in 2012–13 to around 174 million tonnes. This forecast increase mainly reflects the combined effects of falling sugar prices, population growth and rising consumer incomes, particularly in developing countries such as China and India. The forecast consumption growth is similar to the average over the 10 years to 2010–11 of 2.4 per cent.

**Recovery in world sugar exports in 2012–13**

World sugar exports are forecast to increase by 1.6 million tonnes in 2012–13 to 52.6 million tonnes. The forecast increase is driven by an increase in demand for sugar imports by the Russian Federation and Indonesia. Supplies available for export are forecast to increase in Brazil, Mexico and Australia.

The Russian Federation is forecast to increase sugar imports by 750,000 tonnes in 2012–13 to 1.5 million tonnes, in response to a forecast decrease in domestic sugar production.

In Indonesia, sugar imports are forecast to increase by 130,000 tonnes in 2012–13 to 3.1 million tonnes, which reflects a forecast increase in demand for sugar while domestic production is forecast to remain largely unchanged.

Sugar imports into the United States are forecast to remain largely unchanged in 2012–13 at 3.4 million tonnes but with more imports coming from Mexico and less from other exporters. Given sugar production forecast for the United States in 2012–13, it has been assumed that the United States Government will again set its tariff-free sugar import quota (October to September) above the minimum specified under its World Trade Organization obligations. In 2011–12, the United States increased its tariff-free sugar import quota from 1.2 million tonnes to 1.4 million tonnes. In 2012–13, US production will again be much smaller than its domestic consumption.

Brazilian sugar exports are forecast to increase by 2 million tonnes in 2012–13 to 25 million tonnes. This forecast increase is driven by continued strong international demand and forecast record production.

Sugar exports from India are forecast to fall by 1 million tonnes in 2012–13 to 2.5 million tonnes, reflecting a fall in the supply of sugar available for export. Although opening stocks in 2012–13 are forecast to be 4.6 per cent higher than the previous year, consumption is forecast to grow by 10.4 per cent. Additionally, India has been increasing its sugar stocks and closing stocks in 2012–13 are forecast to increase by 1.7 per cent.

Exports of sugar from the European Union are forecast to fall by 32.5 per cent in 2012–13 to 1.4 million tonnes, largely due to a forecast fall in production from last year’s record.

**FIGURE 4: Changes in world sugar exports, 2011–12 and 2012–13, by country**

**World sugar stocks rebuilding to continue in 2012–13**

A substantial surplus in world sugar production in 2012–13 is forecast to increase world closing stocks of sugar by 4.1 million tonnes to 67.4 million tonnes. If realised, this will be the highest closing stocks since 2007–08 and increase the stocks-to-use ratio to 38.8 per cent, compared with around 37.4 per cent in 2011–12.

**Australian sugar production to recover in 2012–13**

The average mill-gate return for sugar cane to Australian growers is forecast to fall by $3 a tonne in 2012–13 to $35 a tonne, primarily the result of forecast lower world prices.
Queensland Sugar Limited forecast its 2011–12 seasonal pool return to be in the range of $510 to $520 a tonne of sugar, International Polarity Scale, compared with $444 a tonne in 2010–11.

Australian sugar production is forecast to increase by around 700,000 tonnes in 2012–13 to 4.4 million tonnes. This forecast

<table>
<thead>
<tr>
<th>TABLE 1: Outlook for sugar</th>
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<table>
<thead>
<tr>
<th>World a</th>
<th>2010–11 s</th>
<th>2011–12 f</th>
<th>2012–13 f</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production Mt</td>
<td>166.0</td>
<td>175.8</td>
<td>177.8</td>
<td>1.1</td>
</tr>
<tr>
<td>– Brazil Mt</td>
<td>38.7</td>
<td>41.0</td>
<td>47.9</td>
<td>16.8</td>
</tr>
<tr>
<td>Consumption Mt</td>
<td>165.5</td>
<td>169.5</td>
<td>173.8</td>
<td>2.5</td>
</tr>
<tr>
<td>Exports Mt</td>
<td>51.8</td>
<td>50.0</td>
<td>52.6</td>
<td>5.2</td>
</tr>
<tr>
<td>Closing stocks Mt</td>
<td>57.0</td>
<td>63.3</td>
<td>67.4</td>
<td>6.5</td>
</tr>
<tr>
<td>Change in stocks Mt</td>
<td>0.6</td>
<td>6.3</td>
<td>4.1</td>
<td>-34.9</td>
</tr>
<tr>
<td>Stocks-to-use ratio %</td>
<td>34</td>
<td>37</td>
<td>39</td>
<td>3.7</td>
</tr>
<tr>
<td>Price USc/lb</td>
<td>27.7</td>
<td>22.5</td>
<td>20.0</td>
<td>-11.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Australia b</th>
<th>2010–11</th>
<th>2011–12</th>
<th>2012–13</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area '000 ha</td>
<td>334</td>
<td>370</td>
<td>385</td>
<td>4.1</td>
</tr>
<tr>
<td>Production c kt</td>
<td>3610</td>
<td>3733</td>
<td>4401</td>
<td>17.9</td>
</tr>
<tr>
<td>Exports kt</td>
<td>2735</td>
<td>3001</td>
<td>3350</td>
<td>11.6</td>
</tr>
<tr>
<td>– value A$m</td>
<td>1436</td>
<td>1681</td>
<td>1513</td>
<td>-10.0</td>
</tr>
</tbody>
</table>

is driven by an increase in the area harvested and an assumed return to average sugar yields. Sugar yields were relatively low in 2011–12 with extensive areas of cane carried over from 2010–11 due to excessive rainfall. Carried over cane generally has lower sugar yields.

Australian sugar exports are forecast to increase by 12 per cent in 2012–13 to 3.4 million tonnes, largely the result of a forecast increase in production. Nevertheless the value of Australian sugar exports is forecast to decrease by 10 per cent in 2012–13 to $1.51 billion, due to forecast lower world prices.

From ABARES 2012, Agricultural commodities: June quarter 2012. CC BY 3.0.

Contact: Email: info.abares@daff.gov.au; www.daff.gov.au/abares
Recently I asked a diverse group of individuals to tell me the first thought that comes to mind when they hear the initials ‘HP’. A rather frivolous request you may think. But have faith in this scribe – there was an intellectual purpose behind this somewhat curious request. You will see how these wonderful two letters of our alphabet can conjure up entirely differing interpretations.

For example, predictively the majority of the group immediately rattled off ‘HP Sauce’, which as everyone knows, for nigh on a century has been embellishing juicy roast beef and succulent T-bone steaks. It has even competed with tomato sauce for the enhancement of the plebeian sausage!

On the other hand, when confronted with HP, the cerebral minds of young fledging bespectacled technocrats automatically switch to Hewlett Packard and that company’s range of computers, printers and all the rest of its doodahs.

HP of course meant hire purchase to the postwar families of the 1950s and 60s, for whom the possession of an Admiral TV, Silent Knight fridge or a Victa lawn mower inevitably involved a visitation to H.G. Palmers, Grace Brothers or their equivalents, followed by the signing of the dreaded hire purchase documents.

Tractor historians (worth their salt) would immediately conjure up images of Hart Parr tractors. To a steam boffin, HP would likely be construed as high pressure, but to a bowler hatted UK MP, HP (couldn’t resist that) means only one thing – Houses of Parliament. Which brings us right back to HP Sauce!

But there is an elite group of humanity to whom the digits HP acquire a very different interpretation to those mentioned thus far. I am of course referring to our cherished farmers and that all embracing terminology HORSEPOWER! Yes, even in this multifarious era of metrication, thanks to the Yanks and their tractor power ratings, good old horsepower remains as relevant today to farmers as it did a century ago. Well, not quite!

To explain and extrapolate it is first necessary to examine the origins of horsepower.

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**‘HP’ – what does it mean?**

By Ian M. Johnston

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To vintage tractor collectors the initials HP translate into Hart Parr. These single and twin cylinder tractors were made in Charles City, Iowa. The unit pictured is a two cylinder 1928 Model 18-36, indicating 18 drawbar horsepower and 36 belt horsepower. The drawbar pull was rated at 4075 pounds at 2.97 mph. This fine example of a classic thoroughbred has been restored by Bryan and Norm McKenzie. (Photo IMJ)

The American Case LA (top) and the Australian Chamberlain 45 KA (bottom) were both popular broad acre tractors in Australia during the 1950s. Both were fuelled by kerosene but the Case featured a four cylinder engine and the Chamberlain an unusual design of horizontally opposed two cylinders. Despite being of similar horsepower, the Case was the more powerful tractor, as indicated by the following table.

<table>
<thead>
<tr>
<th>Tractor</th>
<th>Max HP</th>
<th>Weight</th>
<th>Drawbar pull</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case LA</td>
<td>50.53</td>
<td>7756 lbs</td>
<td>6444 lbs</td>
<td>2.36 mph</td>
</tr>
<tr>
<td>Chamberlain 45KA</td>
<td>47.00</td>
<td>8500 lbs</td>
<td>5800 lbs</td>
<td>2.00 mph</td>
</tr>
</tbody>
</table>

In heavy ploughing conditions the Case would have outperformed the Chamberlain despite the 45KA being the heavier tractor and only a minor difference in horsepower. This emphasises the relevance of the drawbar pull figure.
In the beginning

The dawning of the Twentieth Century saw the commencement of the tranquillity of the country side being disturbed by the raucous sounds of the first tractors. The few farmers who could afford and were bold enough to contemplate the purchase of one of these giant clattering machines, were naturally concerned with the tractor’s ability to pull a plough in comparison with their proven and trusted horse team.

In response, tractor manufacturers arrived at a simple comparison criteria. They stated that a particular model of tractor had the ability to replace a certain number of horses. The terminology utilised by most tractor companies was ‘The number of horses replaced’. Farmers felt comfortable with, and could relate to, this type of down-to-earth analogy.

But as tractor engine and transmission technology advanced, the more scientific and exacting Horsepower ratings were universally applied to tractors. Which begs the question – what is a horsepower? (You’ll wish you had never asked!)

The Scottish inventor James Watt (1736–1819), of steam engine fame, experienced frustrating opposition to his doctrine when he stated that in coal mines steam engines were more practical than horses, whilst engaged in the heavy task of raising coal to the surface.

In a practical test he demonstrated that a horse, walking at the rate of 2½ mph could draw 150 pounds of coal (by means of a rope fed through a pulley) vertically at the rate of 220 feet per minute. This equated, so he determined, to 33,000 pounds, raised vertically to the height of one foot in one minute as being one horsepower!

Quite honestly, my limited expertise in the field of mathematics renders me incapable of establishing how my fellow Scot arrived at this conclusion. (Had Watt been enjoying a wee dram or two whilst making his calculations?) Indeed many mathematicians of repute are similarly perplexed. But be that as it may, Watt’s horsepower rating has been and is the basis for a variety of enduring power related measurements, which include a specific rpm available at the fly wheel and is measured by the resistance to a brake.

Belt horsepower is the actual horsepower developed at the belt pulley and is generally less than the brake horsepower owing to the frictional losses through the gears. But in some early tractors where the pulley is a fixture on the crankshaft, no frictional losses occur. Although not relevant today, belt horsepower rating was important when most tractors were routinely used to drive ancillary machinery such as threshers, pumps, and so on via an endless belt attached to the belt pulley.

Drawbar horsepower was used extensively up until the 1960s and indicated the available horsepower actually at the rear hitch point, but did not allow for wheel slip caused by tyre conditions or soil variances.

Power take off (PTO) horsepower has replaced the belt horsepower in modern times. PTO shafts now do the job of the endless belt and are used mainly for supplying energy to front and rear mounted implements. This measurement is of the power actually available at the shaft and is the figure most relevant to the rating of modern tractors.

RAC horsepower is of no relevance to tractors as it was a figure determined by The Royal Automobile Club and used for taxing British motorists. For the record, the formulae was as:

$$\text{RAC horsepower} = \frac{209}{1000} \times \text{horsepower}$$

Horsepower types

- Indicated horsepower is of little interest to farmers, as it is purely a mathematical figure which indicates the power theoretically developed within the cylinder(s) of an engine.
- Brake horsepower is the power developed by an engine at a specific rpm available at the fly wheel and is measured by the resistance to a brake.
- Belt horsepower is the actual horsepower developed at the belt pulley and is generally less than the brake horsepower owing to the frictional losses through the gears. But in some early tractors where the pulley is a fixture on the crankshaft, no frictional losses occur. Although not relevant today, belt horsepower rating was important when most tractors were routinely used to drive ancillary machinery such as threshers, pumps, and so on via an endless belt attached to the belt pulley.
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$$\text{RAC horsepower} = \frac{209}{1000} \times \text{horsepower}$$
follows: \( \text{Number of cylinders squared} \times \text{number of cylinders} \times 0.4 \).

Added to the above is the need to know if the horsepower in question is maximum or rated. Maximum is determined as being the peak figure achieved for only a brief duration. Rated is a figure that can be sustained over a continuing period.

**Drawbar pull**

Up until the 1970s, drawbar pull was an excellent and widely used measurement to compare a tractor’s field performance alongside those of different models or makes. It was measured in pounds pulled at a given speed. Quite often the results indicated that horsepower was not the determining factor in a tractor’s ability to efficiently pull a specific soil engaging implement such as a plough. Rather, drawbar pull illustrated the ability of the tractor to transfer its engine horsepower to the ground, taking into consideration, weight, traction (wheel spin), gear ratios and engine torque.

Thus a 70 horsepower tractor might well have been capable of out-pulling a different make of 70 horsepower tractor, the drawbar pull being the determining factor.

During the 1970s, US tractor manufacturers seemed to become obsessed with their desire to extract the maximum brake horsepower from their engines, very often at the expense of overtaxed transmissions. Cumbersome counterweights were attached in an endeavour to reduce wheel spin.

The European manufacturers adopted a different and more rational approach. They simply produced more solidly built tractors with better balanced engines having the emphasis on torque rather than horsepower.

Wheel spin of up to five per cent has been proved to be the optimum for pneumatic tyred tractors. Indeed five per cent slippage is not discernible to the eye. It follows therefore that if wheel spin can be observed by simply looking, then it exceeds the five per cent figure and the tractor is not operating at its maximum efficiency and will be applying excessive stress to the tyres and transmission.

**Conclusion**

Back in the 60s, canny farmers who may have been dithering whether to purchase a Massey Ferguson 65, a Fiat 513R or a Fordson Super Major, all similarly powered tractors, would have tossed the coloured glossy brochures aside and insisted upon a comparative demonstration. They would have walked alongside a ploughing tractor to see if they could observe wheel spin. They would also have understood the significance of drawbar pull and its relation to horsepower.

Certainly other factors had to also be considered.
- How did the price compare?
- What sort of a trade-in price would be offered on the old International W30?
- Was the local dealer a good bloke?
- Did he support your footy team?
- Would he deliver the tractor with a full tank of fuel?
- Could he arrange annual higher purchase payments to coincide with your harvest returns? or,
- Did your wife like him?

All important considerations indeed!

To add to the dilemma, in 1960 there were no fewer than 22 makes of tractors available in Australia, which accounted for a total of 126 models! A lot of brochures to pour over!

But at least, away back in the ‘good old days’ a farmer didn’t have to concern himself with the design of the cab or the efficiency of the air conditioning.

**IAN’S MYSTERY TRACTOR QUIZ**

**Question:** Can you identify this strange little tractor?

**Clue:** It is related to chain saws!

**Degree of difficulty:** You will either know it straight away from the clue or spend hours with Google – and still not get it!

**Answer:** See page 30.
MOSSMAN/TABLELAND

The 2012 crush is upon us and haven’t the last couple of months been eventful.

It started in early May when Mossman growers found out that we had been bought out by Mackay Sugar, albeit with a few conditions. Mackay Sugar has successfully acquired the milling and related assets of Mossman Central Mill for $25.3 million, with the transaction completed on June 4.

The transaction involved Mackay Sugar issuing approximately $12 million in Mackay Sugar shares to Mossman Central Mill, and assuming their $13 million debt. The shares, which amount to approximately 3.3 per cent of the issued capital of Mackay Sugar, will be held by Mossman Central Mill.

The news was welcomed by most growers and it now takes away the uncertainty of the future of Mossman Mill. There is a buzz around town as growers move forward to take the appropriate steps to improve their farms to make the most of a decent price and a secure future.

The other issue that growers in the north have had to deal with in recent times is an unseasonal rain event that has postponed any chance of Mossman growers getting any planting done before the season.

Mareeba’s start was affected by the rain with the 2012 crush beginning on Tuesday, May 29 with a wet start. Mareeba’s estimate has come in around 630,000 tonnes.

In late May the northern region received more than 400mm in some areas and this rain affected the start of the 2012 crush on the coast.

Most Coastal mills were due to start in early June but this soon became late June. The Mossman Mill got underway on June 18.

The Mossman Mill’s final grower estimate has come in around 540,000 tonnes and I am confident that this is close to the mark. The total area to be harvested is 7106 hectares with 1551 hectares of this as plant cane. But I do have my doubts on CCS with this late rain sure to bring the CCS down.

When this year’s planting programs get underway, Q208 is shaping to be the dominant variety that will be planted by most growers. Growers are also encouraged to have their planting material checked for RSD. Please ask your local Productivity Board for an appointment so they can come and check your plants with your assistance. Please remember that results take at least two weeks to come back.

I hope to see growers participating at this year’s Mossman Next Generation Cane display to be held at the Mossman Show. Growers are invited to deliver cane to be judged on the Saturday morning of the show. With significant money on offer, it is well worth the effort. For more information please give me a call on 0428 988 136.

Hopefully the weather will be kind to us this year, with forecasters now leaning towards a more average weather pattern for the remainder of the 2012 season.

Let’s hope that the worst of the weather is behind us and we all have a safe crush.

Gerard Puglisi
Northern Region Director
July 10, 2012

INNISFAIIL/TULLY

After a week’s delay, the South Johnstone mill at Innisfail has commenced its 2012 crush. The delay was caused by a wetter than average May which left paddocks waterlogged, preventing a June 5 start. All mills in the wet tropics are now crushing and are looking forward to average CCS and yield figures.

Early estimates for the South Johnstone area are 1.43 million tonnes, with 1.23 million tonnes to be crushed at South Johnstone mill and the balance to be sent to Mulgrave mill.

Mulgrave’s estimate is 1.2 million tonnes and with the adoption of extra cane from the closure of Babinda mill, it will go to continuous crushing mode for the first time in many years. The Tableland mill is progressing well after rain which stopped production at the start. Early figures saw 38,000 tonnes crushed for a CCS of 12.3. With mild days and cool nights, CCS can only rise.

With the excellent weather, farmers took the opportunity to plant remaining fallow paddocks and new areas following the unseasonable May weather.

Failed MIS tree farms have been sold off, with many properties being purchased by cane farmers. These properties are now being cleared of the damaged trees and regrowth in readiness for the planting of sugar cane.

Maryborough Sugar Factory Limited, the owner of South Johnstone, Mulgrave and Tableland mills has purchased approximately 1500 hectares of the failed MIS tree plantations and those properties will also be cleared and planted for harvest next season.
With this positive attitude being displayed by all sectors of the sugar industry, the way forward in the wet tropics appears very healthy.

John Blanckensee  
ACFA Innisfail Director  
July 10, 2012

Tully District Mill report

The Tully Sugar industry experienced a mixed bag as far as weather and growing conditions were concerned throughout the April-May time period.

Some very good growing conditions were experienced throughout April, but heavy rains fell during May, especially in the second half of the month, which caused disruption to early planting and a delay to the proposed commencement of crushing.

A total of 466 mm was recorded in May, mostly in the last 2 weeks of the month.

A large planting is expected for 2012, as the district continues to recover from the very difficult 2010 and 2011 seasons.

Crushing commenced mid June with a crop estimate of 2M tonnes, again a great improvement over the 2011 season and testament to the resilience of the Tully sugar industry.

The milling sector has been very busy with pre season maintenance, and general preparation for what is hoped to be a successful 2012 crushing season.

Greg Shannon  
Cane Production Development and Pricing Manager  
Tully Sugar Limited

HERBERT

Crushing started Monday, June 18 for the Herbert region. At last it is great to see some sunshine and cooler weather to put some sugar into the cane. We are all looking forward to a better year this year. Although production has picked up we still need another year or two to get ourselves back to somewhere near normal.

The failed MIS schemes are fast disappearing around the district and the land will be going back into cane land with some planting already underway. The landscape is looking better with neat ordered drills and in the future unkempt trees buried under weeds and grass will be in the past but never to be forgotten.

The farmers at the southern end of the district have completed their planting while others are just starting in the drier areas, with the wetter areas still waiting to be planted.

There are a lot of paddocks that are showing grub damage as well as feral pig damage. Farming is a never ending challenge.

Here’s to a good season and better times ahead.

Carol Mackee  
ACFA Herbert Director  
July 10, 2012

BURDEKIN

The 2012 season saw all mills off to a slow start due to mixed ground conditions and some mill breakdowns. Kalamia Mill commenced crushing on June 12, Pioneer on the 13th, Inkerman on the 15th and Invicta on the 16th. The district suffered further rainfall late in the following week and all harvesting again ceased. All mills crushed out and shut down after further falls of 15–30 mm of rain across the Burdekin district. At the time of writing burnt cane left in the paddock had yet to be evaluated.

All district mills took the opportunity to undertake chemical cleans and maintenance over the shutdown period.

Meetings with other grower representatives and Sucrogen to discuss wet weather guidelines have currently stalled, while discussions have also taken place on the 2012 Cane Supply Agreement and are also at an impasse.

The cultivated area under cane for 2012 has risen by one per cent or 795 hectares to 90,419 hectares, with an estimated crop of 8.2 million tonnes to harvest.

I recently helped organise a visit to the Burdekin area by an extensive Japanese delegation which included:

- Mr Richard Perry, Assistant Director, Japan and Republic of Korea Section, Trade and Market Access Division, DAFF.
- Mr Kenji Yamamura, Deputy Director, Grain Trade and Operation Division, Crop Production Department, Agricultural Production Bureau, MAFF (Japan).
- Mr Peter Collins, Director, Agricultural Commodities Section, Agricultural Commodities and Trade Branch, DAFF-ABARES.
- Mr Eiji Tanimura, Counsellor (Agriculture), Embassy of Japan, Canberra.

The delegates enjoyed local accommodation and facilities and visited farming enterprises in the Burdekin delta owned and managed by local cane farmers Ian Sheppardson and Chris and Murray Cannavan. The visit included an overview of harvesting and irrigation practices, fallow, plant cane and ratoon cane paddocks as well as innovative management and harvesting methods.

I was able to provide lunch on behalf of the Australian Cane Farmers Association before we moved on to tour local beef producing properties in the afternoon.

The delegation also toured the Burdekin rice trials and this was followed by a tour and presentation of the KFSU factory.

ACFA will again assist with sponsorship of the Hand Cane Cutting Championships to be held later this year, in Home Hill. The event promises to be an entertaining trip down memory lane for many as well as a history lesson for those whose earliest recollections do not stretch back past mechanical harvesting of sugar cane crops.

The event will form part of the Home Hill Lions Harvest Festival with a live band all day; food; a bar; and entertainment for the whole family. For more information contact Tonia Rossato (07) 4782 1050 or 0417 678 847.

Growers are reminded that QSL is providing assistance for farmers wishing to make enquiries about pricing and contact details are as follows: Carla Keith (0409 372 305 Carla.Keith@qsl.com.au) and Cathy Kelly (Mob: 0409 285 074 cathy.kelly@qsl.com.au).

During the cane harvesting season all are reminded that cane trains will operate across the region at all hours. Please take all precautions and stay safe at crossings and sidings. Ensure that all siding inductions and instructions are updated and provide current certification, where necessary. We look forward to a safe and successful harvest for all.

Margaret Menzel  
ACFA Burdekin Director  
July 10, 2012

CENTRAL REGION

The harvest started on June 7 at Farleigh mill. Racecourse commenced on Tuesday 12th and Marian on Wednesday 13th the following week. There have been rain events which brought considerably more rain than usual for this time of the year. Harvesting conditions were generally not favourable. Dry weather with maximum sunlight is needed to improve conditions.
The two day BSES field day attracted a fair crowd on the first day. However rain severely affected numbers on the Friday. Due to the promising crop out there exhibitors had considerable interest and enquiries.

The field day also signalled the end of the planting. Due to the good conditions in early May a lot of farmers took the opportunity to get planting in. Since the field day there have been falls of rain in some areas over 200 mm. This has a lot of anxious farmers looking for germination.

The announcement of irrigation water and electricity pricing has caused great concern. This area generally relies on supplementary irrigation and the greater percentage of growers use electric driven pumps. The price increases are the beginning of more to follow.

Mackay Sugar's announcement of the purchase of Mossman was generally well received, acknowledging there is opportunity to increase throughput and achieve management synergies.

Steve Fordyce
Southern Qld
July 10, 2012

SOUTHERN REGION

Rain and water cost! For the first time in years we would like a bit less rainwater. All storages are full and the ground is all about a vast pudding – the Maryborough area even more so. It just takes a bit of adjusting the mindset to start off a harvest with tracked harvesting gear, when only a couple of years ago everyone was wearing out tracks in bulldust. Kelvin Reibel, one of our Maryborough farmers is buying umbrellas as fast as the local stores get them in. Does he know something we don’t?

More seriously irrigation farmers are coming to realise that when dry weather reappears, paying for water (and electricity) will be a serious issue. Our region is paying for infrastructure when it is not being used as the Part A water charge. The Part B, well it’s not much more, percentage wise, but it is still more. As usual, we as customers want to be able to clearly identify if we are contributing to Sunwater’s overall take or meeting costs associated with the schemes in our local areas. Is the system run as a state-wide operation or are we locally managed? If this seems a recurring theme in Southern Region reports it is because it is one of our major costs and it is not discretionary. What about fuel you might say? Well we all would like to know about fuel you might say? Well we all would like to know about fuel company policy and margins but unfortunately we cannot open that can or barrel. Water and electricity we can fight for so we must.

ISIS Central Mill has taken a big step into sustainability by taking over former SP Exports tomato growing land. This land is now available for lease and ISIS has a panel which will review contenders for leasing these areas. Some very productive parcels are available. ISIS Central will insist upon keeping sugar cane in the rotation on this land, but with the industry outlook that is an asset.

The Tegege Sugar Expo was well attended as usual. Tegege is just a bit north of Bundaberg on the Agnes Waters road and is a great venue. While not being a huge show, Bundaberg farmers have the day for a bit of a chat and swap a lot of good information without lots of snake oil salesman. Very easy going!

Regarding R,D and E, I get the impression the Maryborough area will find that Mitropol will direct their science from home. Flight times to Thailand are comparable to flight times across the USA and many corporations there just accept commuting between west and east coasts as routine. The ISIS area model of an enlarged ISIS Productivity Services will have to commence full time operation now that long serving BSES Extension Officer Jim Sullivan’s position has been closed out. As we see the departure of the Bundaberg based BSES operations, Bundaberg Sugar’s long time partnership with farmers in the Bundaberg area will now become an even more formal arrangement over time.

Cosmas is a science ‘industry’ magazine popular in our house and the recent issue had a focus on rethinking energy. Five forms of energy were discussed, all well known to us – nuclear, geothermal, solar and wind and two systems of storing energy. No mention of sugar cane, which by nature is the greatest energy storer we grow. Could biomass canes solve some of the problems of long distance transmission lines by producing electricity in areas distant from the coalfields? How would the Southern region do more than we already do? Target 100 was an attempt to bring our area up to 100 tonnes of cane per hectare. Will gene technology create 200 tonnes per hectare in the Southern Region? Would this be used for fuel? Is this just science magazine dreaming?

Recently I visited Cow Candy, the never say die stockfeed manufacturers. I just slip off the northbound freeway about an hour and a half out of Brisbane and here they are. The factory looks a little brighter this time. Two years of very wet weather has made it so difficult. Why does the place seem brighter? The crew there have created a new product line. And it sells! Back out on the freeway I ask myself, what makes these people keep on battling on. Wouldn’t it be easier to take a day job? I am sure that this is the sort of place all our modern accepted industrial practices were born. I am also sure my grandchildren will be using technology developed in such a place. I take my hat off to them.

Here’s to big crops and clear skies!

Mike Hetherington
ACFA Southern Region Director
July 10, 2012

NEW SOUTH WALES

The season continues to be unkind to us in NSW with rain, cold weather and the possibility of frost at any time.

The crop at all mills is below a sustainable level, although growers still continue to be optimistic about the recovery to full production in the next two to three years.

Due to the wetter than average season to date (my rainfall records from January to June are just 100 mm short of our average annual rainfall for a year) the soy bean crop which many growers rely on to help the budget, has been less than productive with some not worth putting a harvester into.

Heavy rain is falling as I write this report and this will put all mill starts at risk.

All mills will be reduced to a five day crushing week this year, with our total crop in NSW estimated at around 1.2 million tonnes.

All farmers in NSW realize how critical it is now to raise production back up to the two million + of past seasons, if we are to return to sustainable levels.

The QSL weather forecast while not great for the start of the crush shows a return to more normal conditions as the year progresses. This should go well for the plant cane, as we work our way back to full plantings in this state.

NSW growers just need one normal season – we hope 2012 is it.

Robert Quirk
ACFA New South Wales Director
July 10, 2012

ACFA New South Wales Director
July 10, 2012
What has happened to extension?

Through threats on funding, ASA has forced BSES, a public company, to discontinue its one on one extension services from 30 June 2012. This has caused the industry to lose capacity and valuable people.

ASA’s plan relies on Agribusiness and private consultancies to provide one on one extension to farmers, yet there are simply not enough of these people available. Agribusiness has a conflict of interest over the recommendation of products and many of their people are either under-experienced in or underqualified for extension work. Further, agribusiness has greatly reduced its staff of degree qualified agronomists in recent years.

ASA has already caused our RD&E to be less efficient and more costly

Cane productivity service organisations are hiring as many former BSES extension agronomists as they can afford. This has raised the costs and fees of these organisations.

Despite ASA’s intentions of efficiency, this outcome is inefficient and costly and will raise the aggregate spend on RD&E rather than reduce it, as it shifts the cost of extension onto local structures.

Employed by cane productivity service organisations, extension agronomists are limited in their career path and are more isolated from their colleagues. As opposed to the former scale of BSES, this model will not attract sufficient graduates and those employed could be offered little opportunity for personal development and career path.

Is the current model of a separate BSES and SRDC, failing us?

The current model is not failing. There is not a shortage of funding but rather a shortage of will to fund BSES, fair and square. Currently, our RD&E is caught in a power play.

Has anyone asked the researchers?

During the process so far, sugar industry researchers have been largely left out of the consultation process and when consulted they have expressed a view that they were not listened to.

Potential brain drain

Agricultural industries must compete with other industries for graduates. Currently, there is a shortage of graduates available for the industry to train in research and extension.

BSES has always been the internationally recognised trainer for graduates, providing post-graduate training and career pathways for extension agronomists and research scientists. This career pathway has now been seriously eroded.

Why would ASA want to do such a dramatic thing?

Some in the milling sector appear to see R&D as a cost rather than an investment. They believe that ASA does not have enough control over RD&E direction and funding. For them, the current system is too democratic and has the Federal Government’s involvement which requires wide consultation with industry stakeholders, including payers of the compulsory levy.

Why is Canegrowers backing the ASA proposal?

During the last decade, some mills have not paid their share of BSES funding, while BSES was committed to using its reserves to fund the BSES DuPont Joint Venture on genetic and other advanced technology. This commitment was agreed to by all stakeholders.

Some mills are using this situation to claim that BSES is not viable, yet it is these same entities who are failing to fund the BSES.

The Canegrowers Organisiation has expressed that they are backing the ASA plan because the millers have agreed to equally fund R&D for three years.

Apart from serious flaws in the ASA plan, a miller commitment to fund R&D for three years is grossly inadequate, as the plan would take almost that long to fully implement; while a sugar cane variety takes eight to twelve years to deliver and variety improvement is the keystone of the Australian R&D program.

A short-term funding commitment is not sufficient to justify changes that effectively grant control over R&D to powerful milling companies for no clear advantage.

If ASA is so sure of its plan and its good intentions, why doesn’t it make a ten year commitment?

Cane farmers are concerned that if SRA is formed and there is no turning back, ASA will ask for another concession from farmers or threaten not to sign for a further three years.

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Cane productivity service organisations are hiring as many former BSES extension agronomists as they can afford. This has raised the costs and fees of these organisations.

Despite ASA’s intentions of efficiency, this outcome is inefficient and costly and will raise the aggregate spend on RD&E rather than reduce it, as it shifts the cost of extension onto local structures.

Employed by cane productivity service organisations, extension agronomists are limited in their career path and are more isolated from their colleagues. As opposed to the former scale of BSES, this model will not attract sufficient graduates and those employed could be offered little opportunity for personal development and career path.

Is the current model of a separate BSES and SRDC, failing us?

The current model is not failing. There is not a shortage of funding but rather a shortage of will to fund BSES, fair and square. Currently, our RD&E is caught in a power play.
Can BSES do better?

For any organisation to progress it must assess itself in order to see if it is doing the best possible job for the industry. BSES and SRDC are no different; however it is far more efficient to tune up our current structures than to ask levy payers to back an untested idea which could fail us.

No ‘plan B’

The ASA proposal is a one choice proposal - there is no ‘plan B’. If a no vote succeeds, ASA has no alternative.

Will ASA deliver more research funding?

ASA claims that SRA will deliver a greater pool than the current model. This could only be true if the mills who are withholding funds pay their share. Otherwise, the current system can deliver just as much R&D as the proposed SRA but without the conflict of interest and with much greater transparency.

What can be done?

The simple answer is vote ‘no’. The current model would then continue and ASA would need to approve its funding.

A united alternative

Some of the regions have tired of being pushed around by a ‘top- down’ power structure. They have voiced a need for system where the regions have a greater say in the varieties and other RD&E that they require locally.

A united group comprising the ACFA and other regional groups that share great concern about the ASA proposal have proposed an alternative.

The elements of the alternative proposal are;

- Keep BSES and SRDC intact and separate as now. This removes the conflict of interest by keeping the major R&D funder separate from the major R&D provider.
- SRDC would have a long-term agreement to collect the BSES levy, guaranteeing the funding of BSES.
- Optionally, SRDC would have a long-term agreement to collect the Productivity Services levy, guaranteeing the funding of Productivity Services.
- This model would ensure that millers and farmers paid their equal share.
- SRDC would administer the remainder of the funds as it currently does for competitive research grants to ensure that the best researchers receive project funding.
- SRDC would consult with stakeholders as it currently does to form the most representative R&D plan.
- In addition local productivity services would advise which R&D the local regions require and whether the R&D programs are delivering locally, where they are needed.

Get on with the job

The outlook for our industry is promising. This is a time to concentrate on building the outcomes and efficiency of our existing structures.

This is not a time to gamble on a ‘high-risk’ idea; a ‘six million dollar man’ from people who will only commit for three years.

Don Murday
Chairman
Australian Canefarmers

ANSWER TO IAN’S MYSTERY TRACTOR QUIZ

It is a 1954 Stihl Model 144 powered by a one cylinder air cooled diesel. Better known for its range of chain saws, the German firm of Andreas Stihl Maschinenfabrik produced a range of technically superb lightweight tractors in the 1940s and 50s. Howard Pyor is the owner and driver of the unit pictured. (Photo MJ)
Looking back over questions from readers there are a number of recurring themes and terminal tackle probably tops the list.

From what I see at seminars and read in fishing forum Q&A, it occurs to me that most fishermen aren’t big boat, blue water game fishing, bottom bashers. The average fisho:

- Runs a trailer tinny with a 50hp outboard and chases table species with fair to good quality gear.
- Fishes when he has the time.
- Fishes at night with mates and on the weekend with the kids.
- Wants to land a really good fish just once, but past encounters have ended in sudden smashing strikes or spectacular bust offs. Sound familiar?

The good thing is that it’s possible to fish light tackle from small boats and still have excellent success, the secret is in the terminal tackle and adapting big fish tactics to light tackle techniques.

**Talking terminal tackle**

‘Terminal tackle’ is anything at the action end of the line, so let’s break it down and give you some ideas.

Most fish are lost at the hook. That is to say, the hook pulls out; or gets bitten off; or abrades off on raspy teeth; or is chafed on bottom structure.

Gill slicing – especially with jumping species like Barra – is probably the most common reason for that mysterious clean cut just above the hook.

Severe abrasion above the hook indicates the fish has rubbed its face along the bottom, across coral or over a snag.

So what’s the answer?

Pelagics in a feeding frenzy will often bite you off trying to take the bait or lure away from the hooked fish. This is my single greatest reason for lost tailor and mackerel and the reason I run a stinger hook off the split ring at the head of the lure.

Wire is rarely an option because most fish are canny enough to avoid wire, so serious mono is probably the only real option.

This doesn’t mean packing your reels with tow rope – just upgrade the quality and breaking strain of the last metre or so of your terminal tackle. By quality I mean a good quality monofilament or fluorocarbon. Price is an indication of quality so fluorocarbon at 300 metres for $10.00 probably isn’t going to be quality stuff. Actually $30 for 10 metres is more like it.

**Fishing with fluoro**

While were on the subject of fluorocarbon, a lot of fishermen tell me they use fluorocarbon when the water is dirty because they think it’s less visible to the fish, and it is to a point. But given the price of good fluoro and its limited advantage in dirty water I probably wouldn’t bother. Fluorocarbon was designed originally as ‘tippet’, the last 20 cm of line on the end of the fly fisherman’s leader. At $10 a metre, 20 cm was a reasonable investment when you’d flown half way round the world to catch a trophy salmon in a crystal clear river. It’s all to do with the magical ‘refractive index’.

Let’s talk physics. The refractive index is the degree to which light is bent as it passes from one medium through another. White light is made up of the primary colours of red, blue and green and they all travel at different speeds. When light passes through a transparent substance such as glass or water the primary colours separate allowing you to see the colours of the visible spectrum, as in a rainbow.

Now good – and I stress ‘good’ – fluorocarbon has the same refractive index as water so the light passing through doesn’t...
‘refract’ – when you drop it into very clear water it virtually disappears. This is ideal for gin clear trout streams but not really necessary for the mangrove creeks.

But fluorocarbon has a stiffer outer coating which makes it slightly more resistant to abrasion so it can be an advantage to run a fluorocarbon leader around the snags.

Now, increasing the strength and or stiffness of your leader material is all well and good, but it brings with it two major issues. One is winding it through the rod guides and the other is spool memory.

**Got problems with your wind?**

The wind on problems can be eliminated with good streamline knots such as the Bimini Twist and we’ve dealt with knots in the past so we’ll concentrate on mono memory.

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**Or maybe your memory?**

The issue of memory depends on the diameter of the line, the radius of the storage spool, age of the line and in some cases the brand.

Monofilament is produced in runs of thousands of metres and while it’s still warm it’s wound onto the spools you see in the tackle stores. The finished line is coated in a lubricant which helped it run through the extruding dies and lay evenly and smoothly on the spool. As it cools the line sets in a coil the same size as the spool it’s sold on.

When you wind mono onto your reel it’s easy enough to beat the memory curl by winding the line onto your reel the same way it comes off the spool – heavy leader material is another story.

Fly fishermen use a ‘fob’ to straighten their leaders and tippet material. A fob is a flap of leather with a piece of rubber on the inside. As you pull the leader through the fob the friction created by the rubber generates heat and the rise in temperature causes the molecules in the mono to move into a straight line and eliminates the coil.

This isn’t bad technique for a trout leader with the same thickness as my hairline but for heavy mono using a fob is hard work. The ideal way is to make your leaders in advance so you can stretch the curl out of the mono and take advantage of the speed of re-rigging after a bust off.

What you need is a stretching frame. I use two designs to stretch my pre-made leaders. One is the rack – a rectangular frame with screw eyes at each end and a couple of rubber bands.

The other is the stretching tube. This is my preferred option because it’s safer with the hook points protected. Both frames are cheap to make, safe to transport and make the whole challenge of fishing heavy leaders on light tackle much easier. A speedy re-rig is easy with a loop to loop connection which makes it ideal for fishing at night or in a rolling boat. The only problem I have is losing the rubber bands – I drill a small hole in the tube under the notch and pull the rubber band through and they’re always there when I come back. With the rack I just half hitch them to the eye in the end board.

I’ll be thinking of you while you’re in the shed mastering these feats of engineering because I’ll be fishing my way around the Kimberly and the top end. Any excuse for a product test.

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