Putting ryegrass out to pasture

By Jill Griffiths
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An award-winning PhD thesis sheds light on the real value of breaking cropping cycles with a pasture phase.

Dr Graeme Doole completed his PhD in agricultural and resource economics at The University of Western Australia (UWA) under the supervision of Professor David Pannell from UWA and Dr Clinton Revell from the Department of Agriculture and Food Western Australia (DAFWA). Dr Doole looked specifically at the economics of adding a pasture phase to cropping rotations, considering the combined benefits for managing herbicide resistance and preventing dryland salinity. The thesis was recently awarded the *Australian Agricultural and Resource Economics Society Best Doctoral Research Prize* for 2007.

ABOVE: Dr Graeme Doole believes adding a pasture phase to a cropping rotation can be profitable when factors such as weed control, salinity mitigation, nitrogen fixation, carbon sequestration and grazing are considered. (Photo: Dr R Lawes)

RIGHT: Perennials such as lucerne can be particularly beneficial where salinity is a consideration. (Photo: B White)

key points

- A pasture phase can increase profitability of cropping rotations when the combined benefits of managing herbicide resistance and preventing dryland salinity were taken into consideration
- Farmers are often focussed on a short-term view of profitability and could benefit from a longer term approach.

Dr Doole said that as the relative profitability of cropping has improved and farmers have moved to reduced tillage systems, more herbicides have been used with a greater proportion of farms put under crop each year, with less land allocated to pasture.

The increased use of herbicides, particularly post-emergent selective herbicides, leads to herbicide resistance developing in weeds, such as annual ryegrass (*Lolium rigidum*). Growing annual crops and pastures, rather than perennials, can also lead to the onset of salinity.

"There is not a lot of work that has been done on evaluating the sources of value from a pasture – grazing, nitrogen fixing, carbon sequestration, salinity mitigation and control of herbicide-resistant weeds," Dr Doole said. "When you add up these different values, pasture can be a highly economic and important component of a farming system."

"This is the first study to combine almost all of those factors into one analysis. My computer model examined the economics of adding pasture phases of one to three years duration into the crop-dominated rotations of the central wheatbelt of Western Australia."

Pasture can be established by letting volunteer species colonise, or by sowing an annual or perennial pasture species. In Dr

Doole's study, lucerne (*Medicago sativa*) was the perennial pasture option examined for cases where salinity is an important threat. The pasture's profitability is determined by establishment costs, the level of herbicide resistance, benefits for soil fertility, and the use of the pasture.

"Everyone wants to see more perennials adopted but their profitability generally limits their wide scale adoption by farmers," Dr Doole said. "Including lucerne can be highly profitable over the long term if there is a relatively shallow saline groundwater table, or if the farm has particularly severe herbicide resistance, or if sheep profitability is very high."

Dr Doole said that because lucerne is expensive to establish and has low production in its first year, it sometimes seems to be an unprofitable option for farmers. If its effectiveness in controlling herbicide-resistant ryegrass is taken into account, its profitability significantly improves. Taking into account other factors, such as salinity mitigation, further improves profitability.

In situations where the water table is more than four metres below the surface, Dr Doole said that a sown annual pasture, such as French serradella, could prove more profitable.

"Without herbicide resistance, a continuous cropping system is the most profitable option for the farming situation that I studied," Dr Doole said. "If key weeds develop herbicide resistance that is light-to-moderate, a short pasture phase of one to two years is probably sufficient."

The pasture phase contributes to controlling ryegrass by providing opportunities whereby a range of control strategies can be employed to exhaust seed banks. These include grazing, producing hay or silage, or using non-selective herbicides to spray top, winter clean, or kill the entire pasture at the end of the phase.

Dr Doole used a complex spreadsheet model incorporating automated search techniques to make it possible to identify alternative strategies.

He said although the research was applied to a Western Australian context, there is broad relevance in looking at the multiple values of pasture when considering its economics. The methodology is also widely applicable and has recently been published in the *Journal of Agricultural Economics* and is available on the internet.

More information

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taking time to take stock

As the 2nd International Salinity Forum to be held in Adelaide during April draws ever closer, Forum convenor Dr Richard Price reminds us that the recent drought has only provided temporary respite from rising water tables and salinisation.

"We are an incredibly fickle country when it comes to environmental issues" Dr Price said. "As a nation we seem capable of only focusing on a few icon issues at a time, moving from one to the next before reaching satisfactory resolution of those matters which no longer capture the imagination."

The Forum promises to redress this issue, underlining the impact salinity still has in Australia and across the globe.

It is expected that the Forum will attract more than 500 people, including researchers, farmers, policy advisers and catchment managers.

Speakers of international renown include Professor Warren Wood from the USA who will address the evolutionary nature of global salinity, Professor Roland Robertson of the UK who will address the social concept of 'glocalisation' whereby local action attempts to take place in settings that globally influenced, and Australia's own Professor Will Steffen, who will draw attention to the links between salinity, climate change and other environmental issues.

"This Forum is unique in the approach that it has taken' said Dr Price. "Not only have we experts in the science of salinity as our guest speakers, but we have academic and community-based experts in sociology, economics, policy and environmental impact applying their knowledge to salinity. We will hear new things, and from new perspectives, and I should be very surprised if we are not shaken out of our comfort zones."

Emphasising the global nature of salinity, the event will culminate in sessions drawing comparisons of farms in Australia, Asia and North America, while the respective chief executives of the Murray Darling Basin Commission, Dr Wendy Craik, and Jack Barnett from the Colorado River Basin Salinity Control Forum who will draw comparisons across two of the largest water basins on the planet.

CRC approach pays off

A reflection on the commitment by the former CRC Salinity and FFI CRC to education and training is evident with the inclusion of a large number of presentations and posters by CRC funded students and researchers.

FFI CRC CEO Kevin Goss was quick to point out that 47 postgraduates, who have either been supported by the FFI CRC or the former CRC Salinity, will hold their annual professional development workshop while participating at the Forum.

"The Forum's international delegates will be impressed by the extent to which Australia is building the capacity of the next generation of scientists," Kevin said.

Although the link is slightly more tenuous, additional recognition of the steps the CRC has taken in forging the way forward with saltland research comes as the former CRC Salinity Chief Executive Officer Professor Phil Cocks is recognised for his contributions when he receives his well-earned 2008 Farrer Memorial medal at the Forum.

The *Farrer Memorial Medal* was established in 1911 to perpetuate the memory of William Farrer and to encourage and inspire other agricultural scientists.

The medal is awarded annually to a person who has provided distinguished service in agricultural science in the areas of research, education, extension or administration.

The CRC Salinity was established in 2001 with Professor Cocks appointed as the foundation CEO. During this time Professor Cocks played an important role in establishing the Business Plan for the CRC, which operated across four states and had 11 partners. Its objectives included developing profitable farming systems based on perennial plants.

More information

W: www.internationalsalinityforum.org