

Graziers, pasture seed industry and researchers are concerned about pasture productivity decline.

Gavin Peck¹, David Lawrence¹, Stuart Buck² and Brian Johnson¹.

¹ DAFF, PO Box 102 Toowoomba Q 4350 Email Gavin.Peck@daff.qld.gov.au

² DAFF Biloela, Stuart.Buck@daff.qld.gov.au

Abstract

Productivity decline in sown grass pastures is widespread in northern Australia and reduces production by approximately 50%. Consultation with graziers and the seed industry (seed companies and re-sellers) through focus group discussions and semi-structured interviews were used to collect information on the impact of pasture rundown, management options and what research and development is required to assist industry to improve returns from rundown sown grass pastures. Consultation confirmed that all groups thought pasture rundown is a major issue across southern and central Queensland but there was a range of opinions on primary causes, mitigation strategies and research needs. Graziers are using a range of strategies to reduce the impact of 'rundown', but most have in effect accepted lower productivity either through not adopting or having poor results from mitigation strategies. Mechanical tillage to stimulate mineralisation has been widely used, although much of it has been primarily for sucker control. Many producers have trialled legumes, but relatively few have widely sown them. Results from legumes have been mixed with many producers viewing them as risky and un-reliable despite research and economic modelling identifying legumes as the best option for improving productivity. The most common reason for legumes failing is poor establishment, but industry routinely uses low cost, low reliability establishment techniques. This paper identifies similarities and differences in opinion between the groups consulted and discusses their implications for research, development and extension needs.

Key Words

Sown pastures, pasture rundown.

Introduction

Sown pastures have been a successful technology in northern Australia. Well adapted sown pastures enable higher productivity and profitability in grazing enterprises because they can produce more feed, of a better quality, for a longer period of the year than native pastures (Quirk and McIvor 2005). They have been widely sown in northern Australia and continue to improve production and economic returns from grazing, especially in the beef industry (Chudleigh and Bramwell 1996; Walker *et al.* 1997). It is estimated that up to 70% of the total area planted have been sown to "grass-only" pastures (Walker *et al.* 1997; Walker and Weston 1990).

Sown pasture grasses are very productive when they are planted after clearing or into fertile cropping soils. However, dry matter production and animal performance decline as the available nitrogen reserves decline and become less available to pasture grasses a phenomenon often described as "pasture rundown" (Myers and Robbins 1991). This paper discusses industry (graziers, seed industry and research organisations) experiences with "pasture rundown", the productivity decline that results from a lack of available soil N as sown pastures age.

Methods

Graziers and the pasture seed industry (seed companies and re-sellers) were consulted via focus groups and semi-structured interviews respectively about their experiences with managing productivity decline in sown grass pastures.

Graziers

Graziers across southern and central Queensland were consulted to document their experiences with pasture productivity decline and mitigation strategies to address pasture rundown on their properties.

At the focus group meetings graziers discussed the following questions:

1. What is the extent of productivity decline?
 - How big a problem is it for your business?

- How does it affect your business?
- 2. How do you manage productivity decline in sown pastures?
 - What has been tried?
 - What are the results?
 - What are the main reasons for success or failure?
- 3. What are the biggest limitations to overcoming productivity decline?
- 4. What RD&E is needed for the grazing industries to address productivity decline?
 - What technology would you like to try at home if you had the time and money?
 - What would you like MLA and DEEDI to do to assist?

Seed industry

The seed industry was consulted via a semi-structured interview conducted by telephone. The initial questions asked were:

1. What is the extent of sown pasture or productivity rundown with your clients?
2. How does it affect the seed industry (your business) and your clients?
3. How do you advise clients to manage rundown in sown pastures?
4. What are your thoughts on the practicalities and impacts of perennial legumes?
5. What is the biggest limitation to overcoming rundown in the pastures in this part of Queensland?

Results and Discussion

Graziers

Focus group meetings were held during March and April 2010 with one in each of Moura, Rolleston, Clermont, Roma, Nindigully and Wandoan. Ninety five producers across all locations were contacted and invited to meetings. Eighty were interested and thought pasture productivity decline was an issue affecting them. Forty-one landholders attended the 6 meetings with many unable to attend due to flooding.

Decline in pasture productivity was recognised as being a major problem in all areas with the symptoms being widely recognised. Low nutrient availability (pasture rundown); over grazing and poor water infiltration (land condition); excessive nutrient removal (through crop products) and plant disease were all recognised as contributing to a decline in sown pasture production. However, views as to the relative importance of these causes differed within and between groups. Many participants thought low nutrient availability was less tangible than poor land condition (i.e. low groundcover and high runoff) as a cause of reduced pasture productivity. Several participants attributed classic symptoms of nutrient deficiency to moisture stress.

Reduced pasture quantity and quality from 'rundown' were blamed for reducing production. Graziers were able to estimate the impact on carrying capacity (Table 1). Reduced feed quality was recognised as reducing live-weight gains, but graziers found it difficult to quantify the reduction.

Table 1: Estimates of the carrying capacity since sown pastures were established (where current carrying capacity is described as a percentage of the carrying capacity when pastures are first established).

Focus group	Current carrying capacity	Comments
Moura	50-75%	For some landholders the best scrub country has reduced carrying capacity to levels similar to good forest country. Still declining.
Rolleston	50-75%	Still running down after the benefits of blade ploughing for sucker control.
Clermont	NA	Hard to quantify as pastures have recovered from drought, overgrazing and parthenium.
Roma	50-75%	Much of the Western Downs is still enjoying the benefits of clearing and blade ploughing but significant decline evident.
Nindigully	50%	Rundown buffel is still much more productive than the native species it has replaced on red soils (box, mulga country)
Wandoan	50%	50% reduction without renovation. If production is still running down it is now more gradual.

Graziers have tried a number of mitigation strategies to reduce the impact of pasture rundown. The most commonly used approaches were:

- Live with rundown and accept lower production. In effect this is the most common strategy used with graziers reducing stocking rates to maintain land condition and animal performance. Other options under this strategy include buying more land, developing more land and supplementing cattle. Many graziers are in effect using this option either through not adopting or having poor results from other management options.
- Mechanical renovation ranging from single cultivations (e.g. chisel ploughs, ripping or blade ploughing) through to short term cropping or crop/pasture rotations. The most commonly used mechanical renovation treatment used has been blade ploughs used primarily for woody weed control with the side effect of stimulating the release of N from soil organic matter.
- Legumes for improved feed quality and nitrogen fixation. These benefits are recognised through improved land prices for established leucaena but not for other legumes. Producers reported mixed results from legumes with notable successes but also many failures. Poor establishment is the most common reason for failure of legumes, however the majority of graziers use low cost and low reliability establishment techniques.

Other mitigation strategies discussed but not commonly used were:

- Fertiliser. No one in the groups routinely uses fertiliser on their pastures but several people have tried fertiliser on small areas.
- Spraying out of buffel grass has been used or observed by several graziers to provide a response.
- Fire. Some producers strongly supported the use of fire reporting greener buffel grass and better growth. Others were strongly against fire suggesting negative responses. Research trials have shown no improvement in pasture growth (Graham *et al.* 1985).
- Other grasses. Decline was observed to occur in all sown grass pastures but it was considered that some grasses (e.g. *Bothriochloa* spp.) were better able to cope than others.
- Grazing management was thought to have some positive impacts on reducing rundown, but many of the comments were more about 'land condition' than 'rundown'.
- Woody vegetation rotation where suckers are allowed to grow before being chained was thought to improve nutrient cycling by some participants but was not used by anyone in the groups.
- Slashing is thought to improve grass growth by some participants.
- Soil biology treatment – compost teas have been tried by a few participants with no visible response.

Seed industry

Eleven seed industry and merchandising agronomists in Queensland were surveyed. Of the eleven interviewed, eight are specialist seed marketers and three are more general merchant/retailers who focus on cropping but also sell pasture seed and service some pasture inquiries in their main cropping activities.

All but one of the seed industry specialists believed that sown pasture decline was widespread and was most common or worse with buffel grass pastures but also occurred with other grasses. The dissenting view was that all pasture rundown and land condition decline could be attributed to grazing management and remediated by rotational grazing.

There was a fairly pessimistic view about current trading conditions and the future of the pasture seed industry. While most seed industry representatives believed that rundown was negatively affecting their business, they saw development restrictions (e.g. tree clearing legislation) and tough economic times as larger deterrents to sales of pasture seed. The merchandise/retailers were mostly focussed on cropping and did not see rundown as a major impact on their business other than reduced sales of animal health products from the lower stock numbers that properties could carry.

The combination of tough economic times, tree clearing and land development restrictions and pasture rundown meant seed sales were becoming smaller and there were concerns about the future of the seed industry. A recent swing back to public pasture varieties (non plant breeders rights protected lines) was also seen to be damaging some businesses in the seed industry as grazier bought less expensive seed from neighbours and other farmers.

The seed industry believes that northern regions of Australia have benefitted from stylos that have helped to maintain pasture quality, while medic's and other temperate legumes have been successful in southern Australia. The sown pastures of Queensland need more legumes as grasses still make up the majority of seed

sales. Everyone surveyed acknowledged the need to plant the right legume in the right situation (soil, climate, short or long term pasture). There was however, considerable differences of opinion about how useful different legume species were. Some of this may have been commercially-based with companies with variety rights claiming good results while competitors reported failures.

While effective nodulation was considered important, views on inoculation varied. Inoculation is considered a waste of time in many situations by the seed industry as seed is surface sown and left in harsh conditions before rains arrive. Several people thought that legumes with specific rhizobium requirements were doomed to fail in extensive grazing situations. Others thought that legumes with specific requirements had formed effective nodules with native rhizobium.

Seed coating is widespread in the pasture seed industry. It helps with ease of sowing through machinery and with applying ant treatments, fungicides etc. However, naked seed can provide greater numbers of viable seed per kilogram. The retailers provided strong evidence of a large shift in attitude by graziers against seed coating which was also reported by several graziers in the focus group meetings. However, this is not reflected in the seed industry discussions with companies claiming better establishment with coated seed.

The seed industry thought that better establishment techniques (i.e. at least some control of competition from existing grass pasture) need to be more widely used by graziers. Seed spread after blade ploughing was thought to be particularly un-reliable.

Conclusion

Consultations confirmed that productivity decline in sown grass pastures remains a major problem across southern and central Queensland. Graziers are using a range of mitigation strategies to reduce the impact of 'rundown', but most have accepted lower productivity either through not adopting or having poor results from mitigation strategies. Industry identified the following limitations to improving productivity of rundown sown grass pastures:

- Economics – all mitigation strategies cost money in the short term with returns accruing over time.
- Legume un-reliability. Economic modelling has shown that incorporating legumes provide the best long term returns (Peck *et al.* 2011), but research and development is required to improve their reliability and productivity on commercial properties.
- Understanding the causes, costs and options for addressing productivity decline.

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