PROCEEDINGS OF THE AUSTRALIAN RANGELAND SOCIETY

BIENNIAL CONFERENCE

Official publication of The Australian Rangeland Society

Form of Reference

The reference for this article should be in this general form:

Author family name, initials (year). Title. In: Proceedings of the nth Australian Rangeland Society Biennial Conference. Pages. (Australian Rangeland Society: Australia).

For example:

Bastin, G., Sparrow, A., Scarth, P., Gill, T., Barnetson, J. and Staben, G. (2015). Are we there yet? Tracking state and change in Australia's rangelands. In: 'Innovation in the Rangelands. Proceedings of the 18th Australian Rangeland Society Biennial Conference, Alice Springs'. (Ed. M.H. Friedel) 5 pages. (Australian Rangeland Society: Parkside, SA).

The Australian Rangeland Society

Palatable forbs less prolific than presumed on a black soil site in the Victoria River District

Jodie Ward[A] and Dionne Walsh[B]

[A]NT Department of Primary Industry and Fisheries, PO Box 1346, Katherine, NT 0861. E: jodie.ward@nt.gov.au

[B]NT Department of Primary Industry and Fisheries, PO Box 3000, Darwin, NT 0801.

Keywords: pasture composition, 3P grasses, land condition, cattle grazing

Abstract

Overgrazing around water sources has long been a problem for resource management, and therefore productivity, on cattle stations in northern Australia. This paper presents observations from a demonstration project investigating whether early wet season burning, followed by wet season spelling, every three or four years can rejuvenate a degraded pasture quicker than wet season spelling alone. The demonstration arose as a result of anecdotal evidence that the property manager had had success with early wet season burning and spelling for improving pasture quality and land condition.

BOTANAL surveys have been conducted annually since 2011 measuring pasture yield, species composition, ground cover and defoliation. Early analysis has focussed on species composition at the site and has found that forbs contribute significantly to the yield. However, the majority of the forb species recorded on the site are not considered to be palatable to cattle. Forbs are generally highly regarded by producers as they are usually higher in nutrition than many native grasses. However, when less palatable forbs are dominant, they do not contribute significantly to intake, which can result in lower than expected weight gain over the wet season. The findings highlight the importance of species knowledge and identification skills for land managers. This project is ongoing and will continue to investigate this and other pasture composition trends as the burning and spelling treatments are applied in the coming years.

Introduction

In extensive rangelands, it is widely recognised that cattle have a limited grazing range which is determined by water availability. Cattle often drink during the day and graze outward during the cooler hours of the afternoon and evening before needing to return to water. Areas close to water are thus vulnerable to the effects of overgrazing and can suffer declines in land condition. Poor land condition is characterised by the lack of desirable productive, palatable, perennial (3P) grasses, reduced ground cover and the presence of weeds (Pettit 2010).

In 2009 the manager of Delamere Station in the Victoria River District (NT) identified areas that were degraded as a result of long term grazing pressure. He was particularly concerned about land condition declines on the favourably regarded native pasture black soil plains of the Willeroo 1 land system. When in good condition, Willeroo 1 is dominated by the 3P grass species *Dichanthium fecundum* (Curly bluegrass). *D. fecundum* and other 3P grasses recede under sustained grazing pressure and are replaced by less palatable perennials, annual grasses and forbs (Pettit 2010). Such changes in species composition result in decreased pasture yields, and in turn, a reduction in carrying capacity (McIvor *et al.* 1995). The manager had started an informal program of early wet season burning followed by wet season spelling and was impressed by the pasture quality and land condition results he observed. In 2011 a demonstration trial was subsequently designed to compare whether burning and wet season spelling every three or every four years can rejuvenate overgrazed areas faster than wet season spelling alone.

Methods

The Delamere Burn Spell demonstration comprises two fenced exclosures, starting 1 km from a bore and heading away from it for 1.6 km. Each exclosure contains six treatment plots ~14 ha in size (Fig. 1). Land condition improves with increasing distance from water at the site.

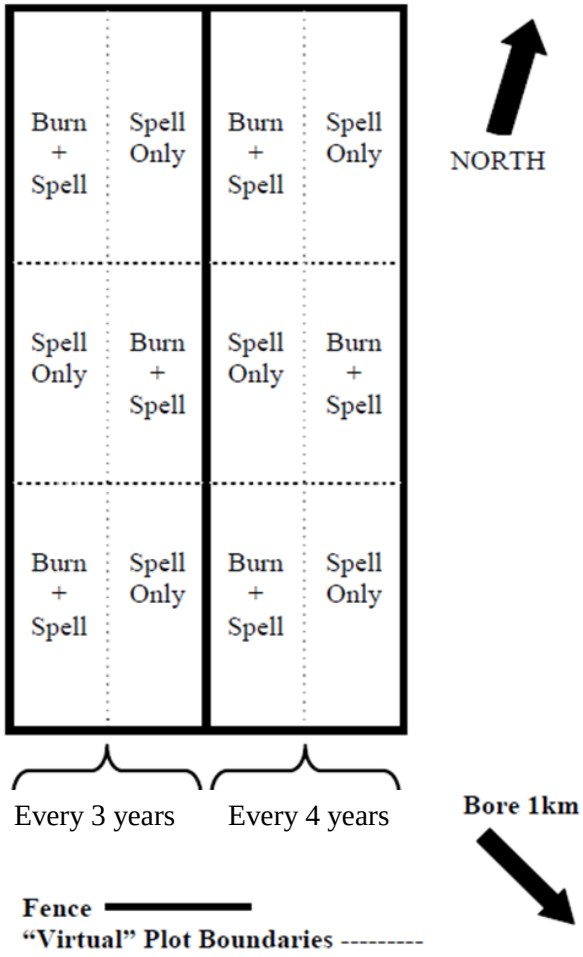

Fig. 1. Design of the Delamere Burn Spell demonstration site. Virtual boundaries are graded lines that are also used as firebreaks.

Originally, the spelling and burning treatments were to be applied every two years and every three years. However, prior to any treatments being applied, the demonstration was modified to be more consistent with local recommendations for burning frequency to manage land condition (see Cowley *et al*. 2014). The treatments being applied are thus:

1. Wet season spelling only (no burning) – none (control), every three years, every four years
2. Early wet season burning and wet season spelling – none (control), every three years, every four years

Following burning of the assigned plots (after the first effective growing rain of the wet season), cattle are excluded from the relevant exclosure for the entire wet season and are then permitted to graze it during the subsequent dry season. In years when there is no burning or spelling, the exclosures are open to grazing at all times. BOTANAL sampling (Tothill & Gillies 1992) and detailed plant demography assessments are conducted at the start of the dry season every year.

All the “burn” plots were burnt in November 2010 to commence the demonstration, followed by burning treatment applications in December 2013 and December 2014. Wet season spelling followed the burning treatment as per the trial design.

Results

As there has only been one application of each treatment to date, no marked differences in species yield and composition have yet emerged. It is likely to take a number of treatment applications to see any statistically significant results. In the meantime, we have been analysing general site characteristics and have been struck by the contribution of unpalatable forbs (UF) to total pasture yield related to distance from water (Fig. 2). In 2012 the contribution of UF averaged 17.2% across the site and levels were quite similar at all distances from water. The average contribution of UF has increased over time (22.7% in 2013 and 27% in 2014). In the past two years, the highest percentages of UF have been found closer to water. It also appears that the contribution of UF to total yield is more variable on an annual basis closer to water. These trends coincide with the complete disappearance of curly bluegrass closer to water in the past two years (data not shown).

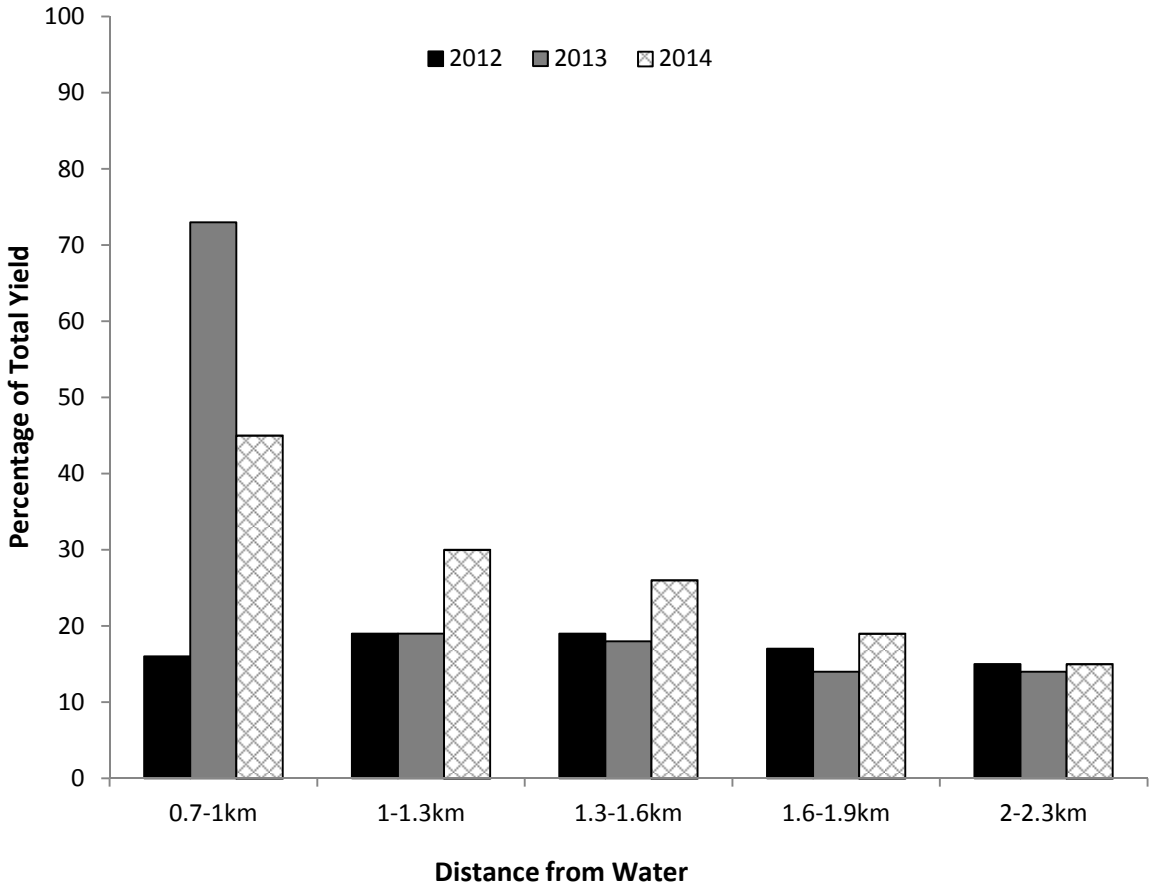

Fig. 2. Contribution of unpalatable forbs to total pasture yield at the Delamere Burn Spell demonstration site (all treatments combined).

Discussion

As land condition declines and inter-tussock spaces of 3P grasses become greater, annual grasses and forbs often increase. This can be viewed two ways. In broad terms, forbs are well regarded in terms of cattle fodder as they are typically higher in protein than the native perennial grasses (Ash *et al.* 1995). However, if cattle find a significant proportion of these forbs unpalatable, then the gains that

could be expected from grazing these pastures will be greatly reduced. Furthermore, annual grasses and forbs are not reliable components of the pastures because their yields are highly variable and dependant on suitable rainfall for growth (Hendricksen *et al*. 2010). Maintaining a balance of 3P grasses and palatable forbs is often recommended for optimising land condition and animal production. Land managers need to be able to confidently identify and have some knowledge of the species in their pastures to ensure that land capability is not overestimated, particularly if land condition has declined.

Conclusion

This trial is only in its early stages. As the burning and spelling treatments are applied over the coming years, species composition will be followed as part of a broader evaluation of the land condition rejuvenation program.

References

Ash, A.J., McIvor, J.G., Corfield, J.P., and Winter, W.H. (1995). How land condition alters plant-animal relationships in Australia's tropical rangelands. *Agriculture, Ecosystems and Environment* **56**, 77-92.

Cowley, R.A., Hearnden, M.H., Joyce, K.E., Tovar-Valencia, M., Cowley, T.M., Pettit, C.L., and Dyer, R.M. (2014). How hot? How often? Getting the fire frequency and timing right for optimal management of woody cover and pasture composition in northern Australian grazed tropical savannas. Kidman Springs Fire Experiment 1993–2013. *The Rangeland Journal* **36(4)**, 323-345.

Hendricksen, R.E., Myles, D.J., Reid, D. J., and Orr, D.M. (2010). Impacts of grazing management options on pasture and animal productivity in a *Heteropogon contortus* (black speargrass) pasture in central Queensland. 3. Diet composition in Autumn. *Animal Production Science* **50**, 276-283.

McIvor, J.G., Ash, A.J., and Cook, G.D. (1995). Land condition in the tropical tallgrass pasture lands 1. Effects on herbage production. *The Rangeland Journal* **17**, 69-85.

Pettit, C. (2010) *Victoria River District land condition guide*. Department of Primary Industry and Fisheries, Darwin.

Tothill, J.C., Hargreaves, J.N.G., Jones, R.M., and McDonald, C.K. (1992). *BOTANAL – a comprehensive sampling and computing procedure for estimating pasture yield and composition. I. Field sampling.* Tropical Agronomy Technical Memorandum No. 78. CSIRO, Australia.