Profitable and sustainable perennial grazing systems: Searching for the right shrub species

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Abstract

A new project – Enrich – is focused on exploring the use of shrubs as a perennial feedbase for profitable and sustainable grazing systems. This approach will deliver benefits to the farm business by stabilising and improving feed supply, and by the management of some environmental threats such as dryland salinity. A key component of this project is the selection of suitable shrub species for use in these systems. Australian species will be predominately of interest, but suitable exotic species will also be considered. Species will undergo primary field evaluation, including investigations of their edible biomass, nutritive value, secondary compounds and morphology indicating their suitability to grazing. Species that match a desirable profile will undergo further evaluation including their response to grazing. It is envisaged that these woody species will form part of a mixed grazing system comprising a number of different species and growth forms Examinations into the interactive dynamics of various species combinations will also be a focus of the study.

Keywords

fodder shrubs, grazing systems, perennials, forage

Background

Australian farming systems based on annual species have created a water imbalance whereby drainage of soil water has increased contributing to dryland salinity. Mimicking natural ecosystems more closely and using perennial plants in farming systems may contribute to addressing this problem.(Cocks, 2003).

Fodder shrubs offer one method of economically incorporating perennial plants into the farm business. They appear especially attractive in the lower rainfall areas of the livestock-cropping zone where alternative perennial options are extremely limited. Additionally, by some climate change forecasts (McInnes et al. 2002), it will be more profitable in this region to devote more land area to grazing than cropping enterprises (Ewing et al. 2005). A significant advantage of utilising perennials in a grazing system is that a green feed supply is available over the entire year as opposed to the annual system whereby summer/autumn feed shortages are common. Species that are able to respond to 'out of season' rainfall will give producers greater potential to respond to increasing climate variability. Shrubs may also provide shelter to livestock and maintain soil cover, a significant advantage in extreme weather events.

Current fodder shrubs suitable for southern Australia's livestock-cropping zone are limited to three species (tagasaste, old man saltbush and *Acacia saligna*). None have been adopted on a widespread scale and are considered to address various niche roles (Revell and Bennell 2006). Whilst Lefroy (2002) painted a somewhat pessimistic view of the exploration of new fodder shrub options (especially of Australian native species), recent studies by the Florasearch project have highlighted that some indigenous species exhibit desirable feed attributes (M. Bennell et al. unpublished data). Pastoralists have long known many Australian species to be an important feed source (Beadle 1946). When grazed by domestic livestock, many indigenous species have also been associated with anti-nutritional factors. However, species may also possess compounds that provide livestock benefits, such as improved rumen function (Wallace 2004) or greater immunity to parasites (Tzamaloukas 2006).

Fodder shrubs are unlikely to be suitable as a sole feed source. However, there is potential to integrate suitable shrub species with other plant types such as commercial pasture species (eg annual medics) or native grasses. A mixture of plant types may not only be more resilient but may also supply a more-balanced livestock diet. Revell and Sweeney (2004) suggest that it may be more productive to meet livestock and environmental objectives by using a suite of species than searching for a single species that meets all desirable criteria.

The recent project, Enrich, funded by the CRC for Plant-based Management of Dryland Salinity, RIRDC Joint Venture Agroforestry Program, Meat and Livestock Australia and Australian Wool Innovation seeks to address these issues and develop new forage systems based around shrubs. One component of Enrich is the selection and evaluation of shrubs that can be utilised in grazing systems of the livestock-cropping zone.

Shrub selection and evaluation

The selection of suitable shrub species for investigation in the Enrich project has at present capitalised on the results obtained by the Florasearch project aimed at identifying Australian woody species with commercial potential. In addition, exotic species have also been included, as well as Australian species from the arid zone. Currently, the selection criteria have centred on evidence (experimental or anecdotal) of palatability, a shrubby growth form, freedom from animal health risks and nutritive value.

The first stage of the evaluation process will involve obtaining germplasm of up to three genotypes of each of the selected species and observing them under field conditions. This will provide phenological and agronomic information, as well as supplying material for screening for beneficial secondary compounds, anti-nutritional factors and nutritive value. Species that contain desirable attributes will be subjected to further experimentation. As the aim is for species to be utilised as fodder plants, the potential for recovery and regrowth after grazing is of paramount importance. The second stage of the evaluation component aims to determine which species are preferentially grazed by sheep and how the tested species respond to grazing.

A mixture of different plant types creates a substantial change from monocultural production and how complementary these types are needs to be investigated. Determining if growing shrubs with grass and/or herbaceous species results in interference (or facilitation) to one or more components of the feedbase will be examined. A significant outcome will be the identification of the best mixture of plant types for a low rainfall grazing system from both an edible biomass and livestock diet perspective.

Conclusion

It is hoped that successful selection of the right shrub species will be the driving force behind farm land use change. This will result in benefits to the farm business through more stable and a better-balanced feed supply, improved animal welfare and salinity and climate change management.

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