The temperate pasture sustainability key program: gathering the knowledge and skills to implement grazing management strategies

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This paper briefly describes some of the background to the implementation of the Temperate Pasture Sustainability Key Program. This program has provided the infrastructure to develop the knowledge and skills necessary for the adoption of grazing strategies to manipulate and maintain perennial grasses as major components of pastures. In the past three years, data from grazing management studies at 22 sites in south-eastern Australia have provided the knowledge to formulate preliminary seasonal grazing guidelines for the predominant introduced and native perennial grasses. At the same time, PROGRAZE courses have been increasing the pasture and animal assessment skills of graziers. Future R & D should build on these successes, encouraging the formation of integrated partnerships to achieved on-farm adoption of grazing systems.

The Temperate Pasture Sustainability Key Program (TPSKP) was initiated by the Meat Research Corporation in 1992 to address issues of declining pasture productivity and low persistence of perennial grass-based pastures. Primarily, this program had three major areas of research; grazing management, drought and sustainability studies and an extension/education package, PROGRAZE. This paper focuses on the role of the grazing management studies and PROGRAZE in developing the knowledge and skills required to implement grazing strategies aimed at changing pasture composition (Lodge 1995).

More than 70% of NSW has been adversely affected by soil erosion, salinisation and woody weed invasion (Reed 1990). The extent and cost of these declines were highlighted by Wheeler (1986), who reported a 47% reduction in carrying capacity of grazing lands from 1970 to 1984. The major cause of this decline is that highly productive and ecologically valuable perennial grasses are being lost from pastures, resulting in lower returns and increased rates of land degradation. These perennial grasses provide year-round ground cover that reduces erosion and their deeper more permanent root systems make better use of nutrients and water, reducing the risk of nutrient loss, acidification and dryland salinity.

There have been several factors associated with a decline of perennial grasses such as; failure to maintain fertility and deal with seasonal droughts, pests and diseases and soil loss; failure to replace pastures that have degenerated, and failure to graze pastures in a way that will keep them productive and persistent. This reflects not only a lack of appreciation of the management needs of pasture, but also a common tendency for producers to concentrate on the management of their stock rather than their pastures and soils. Unfortunately, animals are the least sensitive and last indicator in the soil-plant-animal continuum to signal that a system is not resilient and is becoming unsustainable. This has meant that land degradation has occurred well before animal production has declined.

A survey of producers (Lees and Reeve 1995) in south-eastern Australia, showed that 44% expected their sown species to weaken and disappear within five years of sowing. Clearly, since it takes 5-8 years to repay the cost of pasture establishment (Vere *et al.* 1993) sown pastures in many areas are not providing their expected economic return. If strategic grazing management increased the persistence of these perennial grass-based pastures to 10-15 years in the more marginal areas, without the cost and risk of resowing, then it would be a cost-effective method of achieving sustainable, productive grazing systems.

In devising rules for grazing managers, Lodge (1995) suggested that successful on-farm use grazing systems to manipulate species composition required; a willingness by the land manager to undertake grazing management; an overall management goal and a species composition goal; the potential to change or maintain species composition by management; knowledge on how to manipulate species to move composition in a desired direction, and that the land manager had the necessary skills. To achieve the motivation, knowledge development and skill acquisition that will lead to widespread adoption of such grazing strategies requires a well-planned and coordinated R & D program, across a range of environments and species.

Program descriptions

The objectives of the TPSKP grazing management studies (1993 -1996) were to demonstrate that potentially responsive perennial grass-based pastures or newly sown pastures can be either cost-effectively upgraded or maintained, through grazing management, as 'desirable' pasture for animal productivity and sustainability. The focus of the grazing management studies in the TPSKP was to manipulate composition to improve persistence of species and show that significant changes in pasture composition could be achieved. Translating these changes into animal production gains, demonstrating economic benefits and gaining on-farm adoption are the aims of the Grazing Systems Sustainability Key Program (GSSKP, 1996-2000).

To identify principles and gather the knowledge to develop practical management guidelines 22 grazing management sites were established in spring 1993 at 10 locations in the high rainfall (600 mm) temperate pasture zones of New South Wales, Victoria, South Australia and Tasmania. Across this range of environments a core set of eight common treatments was applied at each site (Table 1). In addition, all sites had an associated Producer Group that was involved in the selection of the site and additional non-core treatments, and deciding stocking rates and site management. Sites were established on either degraded or recently sown pastures of perennial ryegrass, winter active and semi-winter dormant phalaris, tall fescue and cocksfoot. Sites were also established on native pastures containing *Danthonia* and *Microlaena* (Orange and Canberra), *Danthonia*, *Microlaena* and *Themeda* (York Park, Tasmania) and *Aristida* and *Bothriochloa* (Tamworth).

PROGRAZE started as a pilot program in New South Wales in 1993 and has recently been extended to Victoria, Tasmania, and South Australia. It was designed as a grazing management course to give producers pasture and animal assessment skills and to show how these skills could be used in making decisions about matching animal needs and pasture supply. A second phase of PROGRAZE, and its introduction into Western Australia, is planned within the GSSKP.

Table 1. The eight core treatments at each of the 22 grazing management sites

1. Continuous grazing at a level defined in consultation with the Producer Group.
2. Seasonal closure in spring (i.e. 13 weeks rest from grazing), but open to grazing for the remainder of the year.
3. Seasonal closure in summer, but open to grazing for the remainder of the year.
4. Seasonal closure in autumn, but open to grazing for the remainder of the year.
5. Seasonal closure in winter, but open to grazing for the remainder of the year.
6. Increased grazing pressure in spring and communally grazed for the remainder of the year.
7. Seasonal closure in spring with the pasture cut and removed for fodder conservation, with communal grazing in spring and summer.
8. Mob stocking (or rotational grazing) in autumn and winter, with communal grazing in spring and summer.

Outcomes

TPSKP studies commenced in spring 1993 and since then drought has prevailed over much of the high rainfall zone of south-eastern Australia. However, these conditions have provided an invaluable opportunity to study pastures under both drought and grazing stress. Results from the individual TPSKP sites are still being collected and analysed and, although some trends are emerging, responses have not been consistent across the range of sites and species. Overall, seasonal resting from grazing has often proved beneficial to perennial grasses. While resting in spring encourages seed production it also allows competitive annual grasses to grow and set seed. Results strongly indicated that while there are some general principles that can be applied, there is no universal "recipe" for all species and environments.

To start the process of turning data into information, and information into knowledge, preliminary seasonal grazing guidelines have been formulated for tall fescue, phalaris, cocksfoot, perennial ryegrass dominant pastures and *Danthonia/Microlaena* and *Aristida/Bothriochloa* native pastures. This is

the first time that such guidelines have been developed for a wide range of species, and so they are an important step in the right direction. Wider testing and refinement in producer co-learning sites, in the GSSKP, will be pivotal to their on-farm adoption by graziers.

Dry conditions in the TPSKP have generally been unfavourable for seedling recruitment, and so all of the changes in species composition recorded so far have occurred as a result of treatments affecting existing plants and plant buds. More needs to be known about the role and extent of seedling recruitment in the population dynamics of perennial grass-based pastures.

PROGRAZE has been widely acclaimed by graziers as highly successful, with more than 2000 graziers having participated in courses, and 79% reporting that they expect their improved pasture and animal assessment skills to increase farm profitability.

Conclusion

In using grazing management to manipulate and maintain the perennial grass component of pastures, we are coming from a low knowledge and skill base. It takes time to gather the required knowledge and skills and to test and refine them until they can be applied on-farm with confidence. While we are on the right track there is still a way to go. Continued partnerships and co-learning by graziers, researchers, advisers, and industry will ensure that future grazing systems are both productive and sustainable. In the GSSKP, it is planned that the activities of the grazing management and sustainability studies and PROGRAZE will become more closely integrated, through the establishment of regional producer networks and on-farm co-learning sites.

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