New grazing approach is vital for sustainability

Six new principles have been proposed for sustainable grazing in eucalypt woodlands. In the first of a two-part series, CSIRO Sustainable Ecosystems scientists Sue McIntyre, John McIvor and Neil Macleod explain the role of property management planning and how producers can manage soils and pastures to prevent erosion and maintain production and biodiversity. Next month's *Farming Ahead* will look at the benefits of maintaining trees, wildlife habitats and watercourses on farms.

An innovative and sustainable new approach to grazing land management could be the key to ensuring a balance between production and conservation.

A collaborative project involving CSIRO Sustainable Ecosystems and producers in the Moreton and Burnett areas of southern Queensland, has proposed a set of principles for sustainable grazing management of grassy eucalypt woodlands.

The principles cover property planning, soils, pastures, trees, wildlife management and watercourses.

Although the research has focused on sub-tropical grassy woodlands in Queensland, the principles are applicable to many grazing areas in Australia.

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Researchers and producers have developed a set of principles for sustainable grazing in eucalypt woodlands. The principles cover property planning, soils, pasture, trees, wildlife and watercourses.

Landscape thresholds

Historically, agriculture has been strongly driven towards maximising production. In grazing lands the focus has been on running more and better animals through breed and pasture improvement.

Pasture research has allowed significant productivity gains by managing the plant composition.

But to keep grazing systems functioning it is vital to know how far the system can be pushed without going beyond critical landscape thresholds. A landscape threshold is the degree to which an activity can be imposed across a landscape without triggering an undesirable outcome.

The six principles recognise that intensifying land-use, such as cropping, beyond critical thresholds will adversely affect ecosystems and production in the long-term and lead to a decline in native flora and fauna.

Grassy woodlands in southern Queensland have been protected to date by the relative lack of intensification on most properties.

Native pastures are still used and fertiliser application is limited.

But there are salinity outbreaks and tree dieback is widespread. Plant communities on the most fertile soil types have been heavily cleared and many plant species have been lost as a result.

According to the research, there is sufficient evidence for producers to consider a maximum threshold of 30 per cent intensive land use (including cropping, sown pastures and heavy grazing) on properties, together with a minimum of 30% woodland cover, while at least 10% of the property would need to be managed specifically for wildlife. Other thresholds include bare ground (30–40% maximum), dominance by tall and medium tussock grasses (60–70% minimum) and size of woodland patches (5–10 hectares minimum).

Property management planning

When implementing a sustainable grazing property management plan, consider the natural resource base (soil, water, vegetation, wildlife and topography) and its condition. This will determine the potential and limitations for current and future land use.

It is also important to consider the position of the property in a catchment, the existence of significant geological or topographical formations, the contribution of existing vegetation as habitat corridors and its conservation status.

For example, the native grasslands of south-east Queensland are of national significance due to their extensiveness and ecological integrity.

The location of property infrastructure like fences, watering points and yards is often constrained by the practicalities of property management.

But where there is some choice in locating infrastructure, take into account its influence on soil, water and vegetation.

This can include fencing designed to separate different land types, locating infrastructure away from sensitive vegetation or wildlife, locating watering points and stock camping areas apart to reduce pressure and locating areas of high use away from easily eroded areas and watercourses.

Think carefully about management decisions with permanent or long-term impacts, particularly involving cultivation and fertiliser use. Maintaining ecosystems in a healthy state is more cost effective than

in brief

- A collaborative project involving scientists and producers has developed a set of principles promoting the sustainable management of grassy woodlands for livestock production. They cover property planning, soils, pastures, trees, wildlife and watercourses.
- The six principles recognise that if land use intensification is taken beyond critical thresholds it will adversely impact on long-term production and native flora and fauna.
- The proposed thresholds include a maximum of 30 per cent intensive land use such as cropping, a minimum of 30% woodland cover and a maximum of 30–40% bare ground.

TABLE 1 Representative fencing and planting costs included in replanting trees

Fencing	Costs
Four barb and split posts at 10 metre spacing	$2500 per kilometre
Single line electric fence using trees and bush poles	Less than $200 per kilometre
Trees	
Hand planting, tree guards, watering, weed control for three months	$10 per tree
Machine planting of terraces and moderate slopes	$3–$10 per tree

Source: CSIRO Sustainable Ecosystems.

Conservation...

repairing or restoring them. Restoring a woodland can cost thousands of dollars per hectare and will replace only a few of the hundreds of plant species which may have been lost (see Table 1).

Balancing land use

A balance of intensive and extensive land uses is needed to sustain the health and productivity of grassy eucalypt woodlands. The first principle proposed by researchers is to limit the extent of intensive land use to a maximum of 30% of the property.

Impacts of sown pastures and other intensive land uses on grasslands can be direct or indirect. Direct effects include tree clearing, soil cultivation, exotic plants and fertiliser use.

In temperate grassy woodlands research shows intensive land use significantly reduces both native plant and native invertebrate diversity.

In southern Queensland the decline in the health of eucalypt and other native trees is correlated with increased intensification. There appears to be a threshold beyond which the negative impacts overwhelm the ecological processes maintaining tree populations, for example, regeneration and pest control.

Surveys of tree dieback in Queensland indicate properties with more than 50% sown pasture showed significantly higher levels of tree dieback. Fertiliser use, whether applied to crops or pastures, has also been associated with dieback.

Location of land uses

Properties with intensive land uses have a major influence beyond their fence boundaries. These systems often have high fertiliser use and cultivation and herbicides are used to free up resources for use by one or a few species.

As a result, these systems are 'leaky'. Exposed soil can run-off cultivated areas and excess nutrients can leach into watercourses and other habitats. Exotic species may also impact on nearby native vegetation.

Intensive land use needs to be located in a manner that minimises its impact on the farm. It also needs to be balanced with significant areas of low intensity land use.

Intensive land use can be located away from wildlife areas. In some cases it may be possible to use a medium intensity land use to buffer the extremes.

For example, around sensitive wildlife or vegetation areas, locate a buffer of native pasture rather than locating cropping land against the sensitive area.

Similarly, an area of native pasture with scattered trees would be a more effective corridor between woodland or forest patches than cropping land.

Land with the highest potential for agricultural development must retain some vegetation. This has been overlooked in property planning Australia-wide and has led to some vegetation types becoming endangered or at risk such as blue gum, silver-leafed ironbark and poplar box communities in south- east Queensland.

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Keeping ecosystems in a healthy state is more cost effective than repairing them. Planting back a woodland can cost thousands of dollars per hectare and may replace only a few of the plant species lost.

Maintaining ground cover

Living plants and the ground litter of grasslands play a key role in protecting the soil. Without them, surface run-off associated with rain flows rapidly downhill carrying with it soil and organic material.

Ground cover can be reduced by grazing and is influenced by the productivity of the site and seasonal growing conditions.

Living and dead plant material is the major portion of ground cover. This organic matter increases the biological activity of soil and improves soil structure and fertility. This in turn provides better rainfall infiltration.

To minimise soil loss and maintain the functional role of grasslands, the second principle is to ensure the amount of ground cover is no less than 60–70%. Therefore no more than 30-40% of the ground should be bare. This amount of cover is equivalent to 1000–1500 kilograms per hectare of grassland biomass.

Because site productivity and seasonal conditions vary it is not possible to specify the stocking management required to achieve this. Bare ground needs to be monitored.

Overgrazing

Overgrazing of pastures can increase land degradation. Severe grazing tends to eliminate the larger grasses, as well as reduce the total biomass amount. This means less organic matter is available to maintain soil condition, the soil pore structure is affected and rainfall infiltration is reduced. This then results in less organic matter, poor soil conditions and reduced plant growth.

Overgrazing can create a downward spiral toward lower productivity. While the quality of feed on overgrazed paddocks can be high when growth is active, the amount is limited and grass shortages can quickly develop.

Maintaining pasture production

Extreme grazing regimes can degrade the soil resource and change grassland composition.

But a less-discussed phenomenon is the influence of grazing on grassland structure and the impacts this may have on grassy ecosystems.

Sustained heavy grazing can convert native grasslands dominated by large perennial tussocks into smooth-looking grazing lawns dominated by short tussocks or creeping grasses such as couch.

Obviously cattle grazing shortens grass swards but eventually grazing lawns tend to be dominated by species whose potential growth is less.

The loss of large tussock grasses can also impact on native fauna which depend on them for habitat such as rat kangaroos (bettongs) and birds. Tussocks provide an important food resource in the form of seeds and insects.

To balance grazing and resource conservation, the third principle is to graze conservatively to maintain dominance of tall and medium tussock grasses over 60–70% of the native pastures.

It is also important to vary the management of pastures to provide for a variety of species and a diverse range of fodder sources. This will ensure that whatever climatic fluctuations occur there is likely to be some grassland species which will grow well and maintain production. For example, annual plants respond quickly to rainfall and quickly provide quality forage but perennial grasses provide a higher bulk of feed which will carry stock through dry periods.

To support the full variety of grassland species, implement a range of grazing regimes including restricted heavy grazing, a range of stocking rates from light to commercial and paddock spelling at various times.

It is unlikely light stocking rates are going to be used over large portions of a property but they should be represented and are important in areas where vegetation has never been heavily grazed over long periods.

Also consider a range of fire regimes across the property as it will encourage biodiversity and could complement schedules for fodder availability.

Although fire use is highly dependent on seasonal conditions, there may be some value in allocating areas for little or no burning, irregular burning and regular burning.

Acknowledgements: The project is supported by Land and Water Australia, Environment Australia and Meat and Livestock Australia.

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