# How to Lift Wool Profits *and* Improve Biodiversity!

Land, Water & Wool
Northern Tablelands
Project Fact Sheet
10
A woolgrower guide

## Introduction

Research by the Land, Water & Wool Northern Tablelands Project (NSW) identified a wide range of innovations and management practices for profitable, biodiverse wool production in temperate regions.

The project found 41 ways in which Northern Tablelands woolgrowers managing a wide range of farming operations, are enhancing biodiversity on wool properties and developing profitable, biodiverse wool production systems. This Fact Sheet outlines those management practices.

## Something for everyone

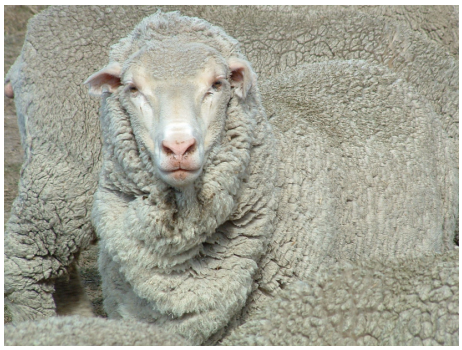
We targeted a wide a range of farm types in our research—farms varied in size, soil type, grazing system, percentage native vegetation, level of inputs and family background.

We interviewed ten woolgrower families, inspected their farms and documented the results in a series of Case Studies and Testimonials. We conducted biodiversity surveys on up to 22 Monitor farms, where most families recorded their production over a 1-year period. After obtaining initial information in a questionnaire (Fact Sheet 7), we also telephoned 29 woolgrowers to discuss their farm management.

There is something for everyone in this list of 41 ways of managing for profitable, biodiverse wool production. However, it is unlikely that you might apply all 41 practices on one farm. Indeed, some practices are mutually exclusive.

So, from the list, choose the practices that fit your circumstances. Fact Sheet 11 describes the Case Studies and Testimonials that provide documented examples of most of these innovations. The practices listed here are best incorporated on your farm through whole-farm planning, to ensure they fit your management system.

Note that many of the practices detailed here rely on everything working just right. Successful woolgrowers have keen powers of observation—watching to see when actions are having the desired effect, and adjusting their management when things start to go wrong.



## Livestock & grazing management

### 1. Sell or begin feeding stock early going into a dry spell

Pastures are a grazing operation's engine room. It pays financially to manage pastures conservatively and avoid overgrazing. Poor sown pasture persistence is a widespread complaint and can be avoided by not grazing out valuable pasture species. Sell excess stock or begin feeding *early* in a dry spell to reduce grazing pressure on valuable pastures.

### 2. Consider high-intensity, short-duration grazing with long rest periods

Pastures require careful grazing management in order for palatable species to persist and out-compete weeds and unpalatable plants. Grazing systems characterised by high intensity, short duration and long periods of rest between grazing events (e.g. cell or planned grazing) encourage uniform pasture utilisation, instead of selective grazing of preferred species. Competitive palatable pastures are able to dominate and out-compete short-lived, unpalatable plants.

If the rest period between grazing events is greater than the longevity of the resting stage of internal parasites, the worm cycle can be broken, benefiting sheep health and reducing drench costs. Long rest alleviates soil compaction, increases litter deposition and infiltration, and allows eucalypt regeneration.

### 3. Or consider rotational grazing

Rotational grazing offers some of the benefits of high-intensity, short-duration grazing, including a reduction in bare ground, weeds and undesirable grasses, less sheep camp effect, and better control of parasitic worms. If one-third of the property is rested from grazing at any one time, 3-4 months of feed are saved up, going into a dry spell or drought. This allows plenty of time to weigh up decisions to sell or feed stock. It also allows valuable pasture species to recover from grazing each year.

### 4. Stock conservatively

Production per hectare varies little for a *range of stocking rates* around a profitable optimum, despite large changes in production per head, variable costs and natural resource impacts. Some tableland graziers may be able to reduce stocking rate by 10-40%, make more money, enhance their natural resource base and work less hours. Apart from the profit and environmental incentive, stocking conservatively offers other benefits. High pasture biomass increases infiltration, reduces erosion and increases flexibility in terms of selling and feeding decisions in dry times.

## Soils & groundcover

### 5. Fence off gully erosion

Gully erosion decreases the area of productive land available for grazing, exports nutrients and soil from the property, and decreases water quality downstream. Fencing gullies to exclude stock and allowing dense vegetation to build up provides a sediment trap to retain sediment and water on-site. It can sometimes allow the erosion to heal itself, and it provides a refuge for grazing-sensitive plants and animals.

### 6. Build and fence off dams in gullies to mend erosion

Gully erosion in drainage lines can be arrested by constructing a dam in

eroded sections, flooding the damaged area and turning the problem into an asset. If the area is fenced to avoid new erosion from being initiated by stock, the dam provides habitat for aquatic flora and fauna and the water can be gravity fed to a trough below the dam for high-quality stock water. Check with the appropriate authority about regulations in relation to your plans.

### 7. Plough less

Most (78%) of New England soils are derived from meta-sedimentary ('trap') or granite parent materials. They are infertile and their structure is susceptible to damage by cultivation. Several woolgrowers have reported sustained reductions in crop and pasture productivity after repeated cultivation. Avoid cultivation to maintain groundcover, organic matter and soil biota and avoid ploughing ground that has never been cultivated.

### 8. Aim for 100% groundcover

Groundcover in the form of pasture and litter protects soil from erosion, increases infiltration and the abundance of soil macro-invertebrates ('soil engineers'), and increases pasture productivity and rainfall use efficiency. Through careful attention to grazing and pasture management, many wool-growers like to maintain 100% groundcover all year round in areas managed for production.

### 9. Lay down litter

Far from losing soil through erosion, some woolgrowers aim to 'make' soil on their properties by allowing a proportion of their pasture production to be trampled into litter and incorporated into soil organic matter each year. Such soils have a greater ability to 'capture' and hold rainfall, can sustain pasture production for longer in drought, and have better soil biological activity.

## Pastures & herbaceous species

### 10. Manage for diverse pastures

Native pastures in New England are mostly comprised of native grasses and herbs with a few volunteer introduced species, and are low cost compared to sown pastures. Native and naturalised (sown-reverted) pastures can achieve high levels of production with fertiliser and clover addition. Native pastures are persistent and drought tolerant. Pastures with a diversity of cool and warm-season species and a mix of perennial and annual plants can potentially produce in every season and every kind of seasonal condition.

### 11. Vary grazing management of native pastures

Different grazing regimes favour different pasture plants, so a diverse range of pastures will result from varying grazing management. Stock can be aggregated in large mobs and cattle grazed ahead of sheep to bash down grass seed, reduce vegetable fault in wool, and open up rank pasture for sheep in late summer-autumn. Sheep may need to be rotated through a series of rested paddocks to break internal parasite cycles and minimise re-infection. At times of low pasture productivity or lambing, it may suit to graze continuously with several small mobs at low stocking rates.

### 12. Increase the cool-season and year-long green pasture and feed component

New England grazing operations traditionally suffer from a shortage of protein-rich feed in winter and early spring due to dominance by summer-active species. Cool-season and year-long green pasture species that help overcome the winter feed drought can be encouraged through grazing management, provision of tree cover, or topdressing native pasture with fertiliser and appropriate seed.

### 13. Topdress native pastures with fertiliser and pasture seed

More fertile soils increase the percentage of desirable native and introduced cool-season and year-long green grass and legume species in a pasture. Many native pasture species respond well to moderate grazing pressure and fertiliser. Native pastures topdressed with fertiliser, legumes and cool-season and year-long green grasses are more productive than unfertilised native pastures, while retaining many of the desirable productive characteristics associated with native pastures.

Note that fertiliser use reduces native plant diversity in favour of introduced species. So if there is a back paddock that has not been fertilised, it may be worthwhile keeping it that way for the production benefits when the natives are really needed. Unfertilised native pasture is also more valuable for conservation.

### 14. Exclude grazing and fertiliser from areas of native pasture

A suite of grazing-sensitive forbs (certain lilies, orchids, daisies, trigger plants and the like) and grasses (e.g. kangaroo grass, wild sorghum) persists across the Northern Tablelands but may be endangered by the extent of commercial grazing. They can be conserved by fencing off areas of uncultivated unfertilised native pasture from livestock, such as the corners of paddocks, steep slopes, areas of shallow soil and rocks, or dense stands of trees.

If you have areas like this, funds are available to continue keeping the stock out.

### 15. Spell pasture in paddocks where trees are being established

Palatable pasture plants benefit from rest and reduced grazing pressure during the tree establishment phase of whole-paddock plantings.

### 16. Establish or retain nectar-producing plants in ungrazed areas

Eucalypt dieback, which contributed to the death of millions of paddock trees in New England between 1960 and 1980, is still a problem in heavily fertilised areas sown to pastures. Many natural enemies (scoliid and tiphiid wasps, tachinid flies) of the defoliating insects that cause dieback require nectar. Encourage a wide range of annual flowering, nectar-producing forbs and shrubs in pastures, so that paddock trees are not further than 200 m from nectar-producing plants. Forbs and shrubs are susceptible to stock—protect them from grazing.

### 17. Avoid or reduce fertiliser in some areas

Paddock eucalypts with elevated levels of leaf nutrients are more susceptible to insect defoliation and dieback. Avoid fertilising pastures within 30 m of native paddock trees, windbreaks and reserves managed for conservation.

### 18. Fence off boggy areas

Boggy areas are sources of fluke infection for livestock and can also bog sheep. To avoid livestock losses, fence off boggy areas to exclude livestock. Grazing-sensitive plants and animals benefit, as well.

### 19. Fence off or pulse graze alkali (salt) scalds

Unrestricted grazing of alkaline (dryland

salinity) seepages results in bare soil and erosion due to stock congregating, trampling and licking the surface. Fence off scalds to avoid bare soil, salt crusts and erosion, increase pasture cover, and reduce surface seepage. Manage grazing to maintain pasture and 100% groundcover.

# Woody vegetation

### 20. Establish shelterbelts using native vegetation

About half of southern New England woolgrowers say they have too little tree cover on their properties (Fact Sheet 7). Shelter is important for:

- *Livestock*—during lambing and shearing in cold weather, and for reducing the energetic cost of thermoregulation to allow more energy for growth and reproduction.
- *Pastures*—optimum pasture growth occurs in milder micro-climates, with reduced wind speed and evapotranspiration. Shelter also helps conserve soil moisture in dry times.

It is therefore important to re-establish shelter across the farmscape, and a common way to achieve this is to plant shelterbelts of trees and shrubs along paddock boundaries. Revegetating north-south boundaries reduces pasture shading and maximises protection from cold, south-westerly and south-easterly air streams. Plantings mid-paddock and along ridges can shelter camps and pastures.

### 21. Establish planted blocks or whole-paddock contour plantings

Other ways of providing shelter in paddocks are to fence off blocks and plant trees and shrubs (either mid-paddock or in the corners of paddocks) or to exclude stock and plant the whole paddock out to trees and shrubs on the contour. Despite a loss of production during the tree establishment phase, the increased survival of lambs and sheep off-shears is sufficient to make blocks and whole-paddock plantings a profitable practice (Fact Sheet 8). Additional benefits of whole-paddock plantings include the provision of shelter and wildlife habitat across 100% of the paddock, the improvement in pasture composition due to the rest during tree establishment, and the potential increase in land value.

### 22. Plant native trees and shrubs to restore tree cover in open country

New England dieback is a graphic demonstration of ecological imbalance in a regional farm ecosystem. Defoliating insects breed up in wet years in environments dominated by sown and topdressed pastures, free from their natural enemies (beneficial insects and insectivorous birds and bats) that require timber, shrubs and nectar-producing wildflowers. By providing habitat for beneficial insects, small insectivorous birds and a diversity of bats, native plantings in pasture paddocks help restore the natural pest control function that has been lost from intensively developed farmscapes.

### 23. Plant introduced trees to restore tree cover in open country

In areas where establishment of natives is difficult, planting introduced species is worthwhile. Introduced trees and shrubs have been planted for 180 years in New England. Over that time, certain species such as radiata pine and Leyland cypress have proved reliable in providing shade and shelter as windbreaks and block plantings. While introduced species don't provide the same habitat for wildlife as native trees and shrubs, many species of insectivorous bird occur in farmscapes dominated by introduced species, and koalas are increasing in such areas. Most people appreciate the autumn colours of deciduous species in New England farmscapes, and radiata pine is a potential income source.

### 24. Establish nectar-producing trees and shrubs (especially Myrtaceae) and acacias in plantings

The beneficial wasps and flies that predate and parasitise the insect pests that cause dieback require nectar. The best nectar-producing shrubs and trees include myrtaceous shrubs that flower annually in spring-summer (*Leptospermum*, *Callistemon*, *Baeckea*) other spring-summer flowering shrubs and forbs (*Bursaria, Dodonaea, Lissanthe, Melichrus, Pimelea* and *Ammobium*) and the many species of wattle (*Acacia*) that have insect-attracting nectaries at the base of the leaves. Eucalypts are also good nectar producers, but they flower infrequently (once every 3-4 years) or not at all when subject to high insect pressure.

### 25. Grow fodder trees and shrubs

Any kind of tree and shrub cover increases bird diversity in pastures, and probably the diversity of bats, canopy insects and pasture species. Areas planted to fodder trees and shrubs for livestock production harbour greater diversity than the pastures into which they are planted.

### 26. Retain native timber

Many New England wool properties retain significant areas of native timber, and the paddocks containing native timber sustain an appreciable portion of the New England sheep flock. Native timber not only provides excellent shelter and a dominance of native year-long green pastures for winter-spring grazing (*Microlaena, Poa* and *Austrodanthonia*), it may also be rich in grazing-sensitive shrubs and herbs, insectivorous woodland birds, arboreal marsupials and bats.

### 27. Exclude stock from native timber

Grazing of native timber by sheep, even at low stocking rates (1 DSE/ha), leads to the decline of native shrubs and grazing-sensitive herbs as a result of selective grazing. Excluding sheep from little-modified areas of native timber for most or all of the time can allow regeneration and conservation of the understorey. Excluding stock from steep, dense or unproductive areas can also reduce mustering costs.

### 28. Promote natural regeneration of timber for stock and pasture shade and shelter, and wildlife habitat

Encourage natural regeneration of eucalypts through appropriate grazing and pasture management to cheaply restore tree cover in pastures.

### 29. Retain blackthorn (*Bursaria spinosa*) shrub understorey

Blackthorn is a hardy native shrub that can survive modest sheep grazing pressure in some open paddock situations. Blackthorn creates a fertile micro-environment in which cool-season and yearlong green grasses, such as microlaena, cocksfoot and phalaris, prosper well into dry spells. Blackthorn thickets also provide shade and shelter for livestock, and the flowers provide nectar for beneficial insects.

### 30. Direct seed trees and shrubs to restore woody cover to paddocks

Direct seeding trees and shrubs is marginally cheaper per hectare and one-fifth of the cost per tree, compared to tubestock plantings.

### 31. Retain dead timber on ground

Dead timber on the ground can provide valuable shelter for lambing ewes and sheep as well as a fertile micro-site for year-long green and cool-season grasses to flourish. Dead timber also provides habitat for reptiles, frogs, certain declining woodland birds, insects and fungi. Although dead timber needs to be managed to avoid rabbit and fox infestations, many woolgrowers resist cleaning up standing and down dead timber for the production and biodiversity benefits.

### 32. Fence off boggy areas and plant to trees and shrubs

Boggy areas harbour liver fluke and may result in stock losses due to sheep bogging. Fencing off boggy areas and planting them to trees and shrubs

avoids stock losses and dries out the area, providing islands of shade and shelter in pasture paddocks, and providing habitat for wildlife.

### 33. Fence off rocky areas to encourage tree and shrub establishment

Rocky areas in paddocks may have been spared past cultivation, fertilisation and heavy grazing. They often retain more of the original vegetation than adjacent pasture. Rocky areas can be fenced off to encourage natural regeneration of woody plants or enriched with shrub and tree plantings to provide islands of wildlife habitat and stock shelter in pasture landscapes. Avoid planting too much woody vegetation in these areas, as the conservation value of the herbaceous layer can be jeopardised by soil disturbance and weed invasion.

## Farm dams & waterways

### 34. Fence waterways and wetlands and graze conservatively

Unrestricted stock habitually overgraze riparian zones, resulting in low pasture biomass, bare ground and stream bank erosion, high dung and urine content of the water, and poor water quality. Riparian zones can be fenced and grazed separately to adjacent paddocks, in order to maintain high vegetation levels and 100% groundcover, reduce erosion, slow down runoff and improve water quality. Incised and degraded drainage channels may ultimately revert to a more desirable chain of ponds.

### 35. Fence waterways and wetlands and graze them conservatively, but leave an access point for livestock

To avoid pumping or reticulating stock water from creeks, bores or dams, some woolgrowers manage most of their riparian zone separately from adjacent paddocks (as above) but leave a strategic stock water access point in a rocky or artificially hardened part of the waterway.

### 36. Establish trees in riparian zones

To restore tableland streams and chains of ponds to their original wooded condition, revegetate waterways and flood plains devoid of trees to improve stock shade and shelter, stabilise soils, slow down high flows, trap and settle sediment (free fertiliser from upstream), and improve infiltration in floods.

### 37. Revegetate upwind of water bodies

Exposed water bodies can lose up to 7 mm of water per day through evaporation in hot, windy weather. Conserve water and provide shade and shelter for stock by revegetating upwind in the vicinity of farm dams and ponds.

### 38. Fence farm dams to exclude livestock and reticulate clean water to troughs

Cattle and sheep dung and urine are often concentrated in and around dams where stock have unrestricted access. To improve water quality for livestock and aquatic flora and fauna, fence dams to allow dense pasture to filter inflows of excrement, sediment and fertiliser. Gravitate clean water for stock to a trough downslope. The vicinity of fenced dams can be planted to trees and shrubs to improve amenity and habitat value, and reduce water loss.

### 39. Provide multiple water points

To reduce overgrazing, trampling and fouling impacts of stock congregating around a single water point, provide multiple water points per paddock.

### 40. Excavate and fence seepages to create artificial wetlands

Boggy seepages that are problematic for liver fluke, stock bogging, poor pasture productivity and erosion can be excavated, fenced and converted into artificial wetlands to provide clean stock water and habitat for aquatic flora and fauna.

## Vertebrate pests

### 41. Reduce fox numbers

Foxes are a menace at lambing, and are responsible for more extinctions of mammals in the critical weight range (35 g to 5.5 kg) in Australia than any other single cause. Reducing fox numbers on wool properties increases lambing percentages and the chances of small to medium-sized mammals surviving in or returning to farmland. Although tree plantings can provide harbour for foxes, they also provide a focus for fox control activities.

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another innovation

native vegetation and biodiversity

improving farm profits through biodiversity

Land, Water & Wool (LWW) is the most comprehensive natural resource management research and development program ever undertaken for the Australian wool industry. LWW is a partnership between Australian Wool Innovation Limited and Land & Water Australia, and has seven core sub-programs. The Native Vegetation and Biodiversity sub-program is working with woolgrowers, and demonstrating that biodiversity has a range of values, can add wealth to the farm business and can be managed as part of a productive and profitable commercial wool enterprise.

The Land, Water & Wool Northern Tablelands Project is led by Associate Professor Nick Reid, University of New England, in collaboration with Southern New England Landcare Ltd, and the Centre for Agricultural and Regional Economics.

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