



Above—Richard & Mary Maclean at 'Woodville East'. Photo by Kären Zirkler.

# Wool production & biodiversity Testimonial Richard & Mary Maclean

## 'Woodville East'

### Location

20 km north-east of Armidale, New England Tablelands NSW, Macleay catchment

### Property size

508 ha (1255 acres)

### Paddocks

90

### Average annual rainfall

755 mm (average 15 yrs to 2005)

800 mm (long-term average)

### Main enterprise

Superfine wool (16-17 micron), and fattening cattle

### Stock numbers

2300 wethers, 100 cattle

### Stocking rate

8 to 10 DSE/ha but as low as 5 during drought

### Main soil types

Basalt with small areas of traprock

### Vegetation types

Native and naturalised pastures. Scattered trees and stands of white gum, Blakely's red gum, yellow box and stringybark remain on the southern half.

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## Introduction

Richard and Mary Maclean purchased 'Woodville East' in 1980 and moved there in 1987, although Richard has known the property since 1946.

This testimonial explains how Richard and Mary are able to successfully blend their production goals and lifestyle goals with their desire for a healthy, biodiverse environment.

## The farm & its enterprises

Mary and Richard Maclean run superfine wool Merinos and beef cattle on 'Woodville East'.

Cattle are commonly used in grazing systems on the Northern Tablelands for enterprise diversification, to help control internal parasites in sheep, and to graze long grasses that cause vegetable matter in wool.

Most of 'Woodville East' is either native pasture or volunteer native pasture. Some areas have been cropped in the past for forage or grain, or sown to pasture. There is also a small amount of remnant stringybark-box open forest and large, scattered paddock trees on the southern half of the property.

## Grazing management

While set stocking is still practised by woolgrowers in the region, there has been a move over the last few years to cell or planned grazing. Mary and Richard started using planned grazing (high-density, short-duration grazing with long recovery periods) in March 2000 as part of a trial of the Holistic Management approach promoted by Allan Savory.

Their land management aims include encouraging a largely self-sustaining, dense, native and naturalised perennial pasture with tree and shrub regeneration; and building soil by

increasing organic matter. These aims have far reaching implications for the landscape, and address all the big issues concerning biodiversity, soil health, weed infestation, erosion and salinity.

In order to successfully implement these aims, the Macleans recognise the importance of the decision making process and follow the Holistic Decision Making framework developed by Savory. This requires each decision to be tested against a Holistic Goal which, in turn, focuses attention on environmental, social and economic issues. This is sometimes referred to as the 'triple bottom line'.

Mary and Richard believe constant attention to the triple bottom line is crucial to long term sustainability of the land, to a stable society, our economic wealth and, indeed, civilisation as we know it.

The grazing process implemented on 'Woodville East' includes:

- large paddocks subdivided into small 5-10 ha areas, often using portable electric tape
- a large mixed herd of 2300 sheep and 100 cattle (numbers vary with seasons)
- planned grazing, so that each paddock is recovering most of the time, with only intermittent periods of brief, high-impact grazing by a large mob.

Grazing periods at 'Woodville East' vary between 1-3 days per paddock.

When pastures are growing rapidly

Below—Wethers grazing at 'Woodville East'.



## Pasture and tree cover on 'Woodville East'

The previously farmed black soil flats and drainage plains of 'Woodville East' support wallaby grass (*Austrodanthonia* spp), brome grasses (*Bromus* spp), swamp foxtail (*Pennisetum alopecuroides*), paspalum (*Paspalum* sp.), plantains (*Plantago* spp) and native sorghum (*Sorghum leiocladum*).

Basalt slopes support mainly wallaby grass, tussock (*Poa sieberiana*) and speargrass (*Austrostipa* sp.), redgrass (*Bothriochloa macra*) plus many native forbs including bluebells (*Wahlenbergia* spp), bear's ear (*Cymbonotus lawsonianus*), golden everlasting (*Bracteantha bracteata*) and poached egg daisy (*Ammobium alatum*).

Native sorghum, kangaroo grass (*Themeda australis*), bluegrass (*Dichanthium setosum*), native plantain (*Plantago debilis*), meadow foxtail (*Alopecurus pratensis*), common wheat grass (*Elymus scaber*), weeping grass (*Microlaena stipoides*), paddock lovegrass (*Eragrostis leptostachya*), Parramatta grass (*Sporobolus creber*) and several native legumes (*Glycine*, *Desmodium*, *Hardenbergia* spp) are increasing throughout the property.

Most of the southern half of 'Woodville East' has scattered tree cover, mainly white gum (*Eucalyptus viminalis*), yellow box (*E. melliodora*), Blakely's red gum (*E. blakelyi*) and stringybark (*E. caliginosa*).

An unusual feature for the region are the magnificent old-growth specimens of white gum, Blakely's red gum and yellow box around the house and in the paddocks to the south-east. Three barking owls, which require large hollows for nesting and shelter by day, stayed around the house for a few nights in these trees in 2003 and have been heard on occasions since.

A 6-ha basalt outcrop featuring a small remnant of yellow box, stringybark and white gum has been fenced off for conservation and as a connecting link in a network of recently established wildlife corridors involving 'Woodville East' and two adjacent properties. There are scattered large hickory wattles (*Acacia implexa*) and native cherries (*Exocarpus cupressiformis*) on the outcrop and the shrub layer of blackthorn (*Bursaria spinosa*) is covered in beautiful blue metallic scoliid wasps during flowering. Scoliids are important natural enemies of scarab beetle larvae. Scarab beetles are one of the main causes of eucalypt dieback on the Northern Tablelands. Native pastures surrounding this area include woodruff (*Asperula conferta*) which also supplies the scoliids with nectar year round.

under good seasonal conditions, Richard and Mary increase the speed of the rotation, since a shorter period of pasture recovery is required between grazing events. Repeated 'bites' of a plant during fast growth impairs the plant's ability to recover, so moving faster discourages this.

In periods of slower growth, the recovery phase needs to be longer to allow the pasture to fully recover. Recovery periods at 'Woodville East' presently vary between 80 and 150 days, but the Macleans would like to extend that out to 6-7 months at times of slow growth to get maximum pasture regeneration. In practice, this means there is a need to have animals saleable at all times so that stock numbers can be adjusted in times of low rainfall. The Macleans consider hand feeding stock to be unsustainable environmentally, economically and in terms of personal workload.

## Fencing

Mary says, 'each year, we have been putting money into fencing and water that we would previously have been spending on fertiliser, seed and tractor fuel.' The Macleans have installed about 10 km of permanent fencing since 2000, with a bit of help from 'Envirofund'. Today, the 18 or so original paddocks are subdivided into about 90 small paddocks, still partly using electrical tape. 'Portable fencing is cheap and helps avoid putting permanent fences in the wrong place while we gain experience,' says Richard.

The property is now drought-proofed with a gravity-fed stock watering system, which includes the use of portable water troughs.

Since implementing planned grazing, Richard and Mary have noted many changes in pasture productivity and composition, wool quality and biodiversity. These are outlined below.

*Right top—Pinrush is declining in some areas of the landscape, the tussocks being invaded by more palatable, competitive grasses. Photo by Kären Zirkler.*

*Right bottom—Native grasses such as this wallaby grass are allowed to flower and set seed.*

## Ecosystem changes

Richard and Mary attribute many dramatic changes in the 'Woodville East' pastures to the move to planned grazing since 2000. The theory is that when palatable grasses are quickly grazed and then allowed to completely recover, they become more vigorous and out-compete weeds, less palatable perennials, and annual grasses. In effect, planned grazing selects for the more desirable perennial grasses rather than annual grasses and weeds. One stony hillside covered in Mexican poppy and saffron thistle quickly reverted to grass dominance with no weeds present and with no treatment other than the shift to planned grazing.

*Poa tussock* has been a less desirable dominant species under set stocking, and tussock is still abundant in the district. **However, on 'Woodville East,' some of the tussock is now grey and moribund, being out-competed by the wallaby grass, redgrass, microlaena and other more productive species that are increasing under planned grazing.** Other *poa tussock* is healthy and apparently increasing in palatability, being readily grazed, together with other grasses known to be more nutritious. Pinrush had also been increasing, moving out of drainage lines and flats and on to slopes. However, these patches on the slopes are now largely senescent and are being invaded by a variety of more



competitive grasses and forbs. Swamp foxtail (also less desirable) was replacing pinrush in the drainage plains and damp patches on the slopes, but this is also a passing, successional phase. Phalaris and paspalum have volunteered along some of the watercourses and damp areas, invading the clumps of pinrush and swamp foxtail.

The behaviour of the pinrush under planned grazing could be linked to improvement in the water cycle, with deep rooted perennials encouraging easier water penetration to deeper levels. A shift from non-aerobic to aerobic soils in these damp areas, which were becoming increasingly waterlogged under set stocking, could also account for these changes. The tussock poa and pinrush may be declining because of what's going on below ground with root structures. Root competition from increasingly vigorous perennial grasses may cause the pinrush and tussock to decline.

The Macleans have noted that the soil is not cracking in recent droughts as in

previous ones. The black soils previously formed large cracks, demonstrated by Richard once getting the front wheel of the tractor wedged in a large crack. During the summer of 2002-2003 cracks were very modest where they occurred. With the additional biomass (pasture and litter), and with the increasing soil organic matter, the soil has a greater ability to capture precipitation and conserve moisture, and therefore cracks less.

The improved health and condition of pastures and soils at 'Woodville East' means greater infiltration and more effective rainfall use for pasture production. This was evident in a recent project across 39 sites on the Northern Tablelands conducted by Dr Judi Earl (Agricultural Information and Monitoring Services). Water use efficiency and plant growth at the 'Woodville East' sites were all above average. The two sites where planned grazing had been implemented the longest



Above—small forbs like woodruff are coming back into the species mix.

recorded the highest infiltration rates of any sites.

At the height of the drought in early February 2003, perennial grasses were still green, actively growing and setting seed right across the property. The grasses must have had access to adequate soil moisture.

## Product & profit changes

### Wool quality increases

The change in grazing management on 'Woodville East' and the Macleans' decision to stop breeding livestock and buy in sheep and cattle has affected wool quality in various ways.

Vegetable matter in wool has meant that New England graziers have traditionally kept their pastures short to avoid this. Surprisingly, perhaps, vegetable matter has not changed greatly on 'Woodville East' since the changes in grazing management, despite the increased pasture length and seeding of native grasses. With the increase in perennial grasses and the reduction in bare ground, there are now fewer annual grasses, thistles and burrs that traditionally caused vegetable fault in the 'Woodville East' clip. Grasses do not have to be short to limit vegetable fault in wool.

Tensile strength has increased at the same time as average micron has decreased (Fig. 1). The sheep are continually being shifted on to fresh, high quality pasture that has been rested for up to 3-4 months, uncontaminated with urine and dung, and are therefore on an even plane of nutrition required for superior wool strength and quality.

Mary says, "The livestock get a smorgasbord of nutritious pasture in each new paddock." She believes this to be superior to either a monoculture of winter forage oats or the limited species offered by sown pasture.

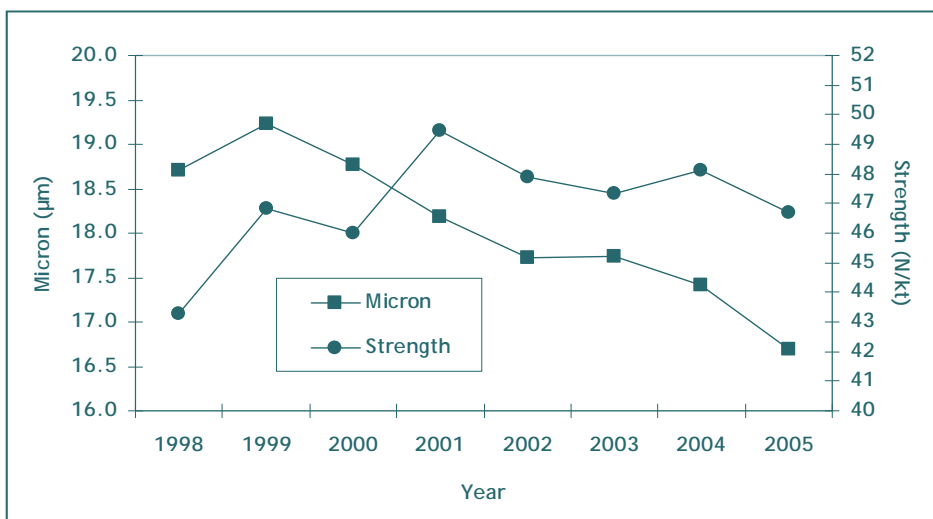
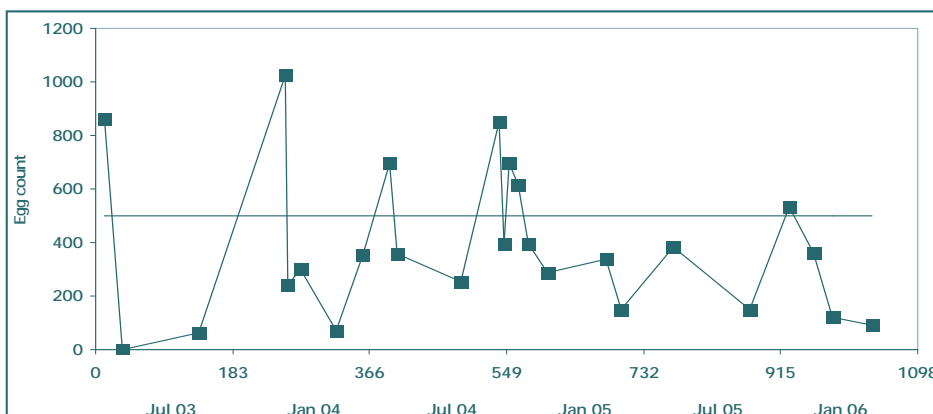


Fig. 1 (above)—Weighted average of wool micron and strength for the entire 'Woodville East' wool clip between 1998 and 2005.

Fig.2 (below)—Egg counts conducted by Mary and Richard Maclean from April 2003 to January 2006. Values are averages of 10-20 samples. A value of 500 or more may give cause for concern. The Woodville East sheep flock did not require drenching in this period, because follow-up samples after high counts showed worm burdens quickly dissipated.



The increase in tensile strength has been maintained despite recent poor seasons. The higher tensile strength fetches a premium price, and buying and selling of sheep to get the micron, wool quality and style right, all add up to increased wool income and profit.

### Input costs decrease

Input costs have decreased. No hand feeding has been necessary since stocking rate and carrying capacity have been matched to season.

Drenching has not been necessary since April 2003: the short grazing, and long recovery periods afforded the pastures have broken the worm life cycle (Fig. 2).

No artificial fertiliser has been applied; healthy soils are achieved as increased soil organic matter leads to the supply of nutrients by active soil biota.

Further profit has been achieved by careful attention to the triple bottom line.

## Biodiversity changes

### Natural regeneration

After several years of planned grazing, scattered paddock trees appear to be much healthier. Red gum and yellow box have started regenerating naturally in a grassy woodland paddock. It is hoped that other eucalypts will do the same, and obviate the need to replant in these areas. This would create a saving in time and costs.

### Bird species increase

The increase in pasture biomass on the drainage plains and along the water courses has provided tall tussock grassland, sedgeland and reedbed habitat for golden-headed cisticolas since 2002. This is the first time they have been seen on the property.



Between 2000 and 2003, an increase in small insectivorous bird species was noticed in the long driveway to the homestead. This coincided with the introduction of planned grazing to the driveway, which was planted to native trees and shrubs in 1990.

### Possums & bats

In recent Land, Water & Wool-funded fauna surveys in the region, the hollow-dependent sugar glider was recorded at 'Woodville East' and only three other farms out of the 18 properties surveyed. 'Woodville East' also returned nine species of bat using Anabat® recording equipment, as many species as on any of the 18 properties surveyed. Bats provide an important insect pest control service, eating a large proportion of their body weight in insects each night. They are doubtless attracted to the hollow old-growth eucalypts on the southern half of the property.

### Lizards increase

With the increase in pasture height and feed availability, Richard and Mary have noticed an increase in lizards out in the paddocks (particularly penny lizards, blue tongues and skinks).

## Holistic success

Mary and Richard have been thrilled with the changes to their farm since they started their experiment with Holistic Management. Ecologically, their farm has responded strongly to the changes in grazing management. The water cycle, soils, ground cover, pastures, wildflowers, trees, birds and other wildlife have all registered improvements. Richard and Mary are very satisfied with the positive changes they have made and are also enjoying more leisure time to indulge their many other interests.

'Woodville East' is a great example of profitable, biodiverse wool production, and of how quickly the farm ecosystem and bank balance can respond to thoughtful, sensitive management of livestock and the environment.

Left—yellow box and hickory wattle seedlings, respectively, regenerating naturally.

# LandWater & Wool

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The Native Vegetation and Biodiversity sub-program of Land, Water & Wool 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.

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