

# Perennial shrubs support productive pastures

**A** diverse mix of perennial shrubs is proving a productive and practical solution to the autumn feed gap in low- to medium-rainfall areas.

Early results from the Future Farm Industries CRC and Meat and Livestock Australia-funded *Enrich* project site at Monarto, South Australia, reveal that perennial shrubs can provide valuable feed during autumn supporting, but not outcompeting, the inter-row pasture mix.

SARDI senior research scientist, Jason Emms reveals that the Department of Environment and Natural Resources (DENR) Monarto site, established during 2006 on a 15 hectare paddock, now contains about 14,000 perennial shrubs – a dramatic four-year transformation.

“The focus of the site is to provide information on individual shrub species production, the performance of the shrub and inter row pasture mix and plant and animal interactions,” Jason explained.

“In the early days of the project, the performance of about 80 different native

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shrub species was investigated for their potential as perennial forage.

“From this early research, the project has shown that a diverse mix of plants can be grown and grazed without affecting pasture production and we have now developed a shortlist of species with significant potential.”

Jason believes the results demonstrate there is no single silver bullet species that will provide the total forage and animal production benefits, but the key is a mix of complementary species (see Table 1). This approach fits with the *Enrich* project’s overall hypothesis that having a diverse mix of native shrub species in the perennial feed base will give multiple plant, animal and environmental benefits.

Some of the benefits of perennial shrubs include:

- Providing green feed during summer and autumn
- The ability to respond to out-of-season rainfall
- Improving animal health through unique nutritive and bioactive properties, such as reducing methane production
- Providing shade and shelter and reducing erosion, soil degradation and salinity.

## Persistence and production

The ability to survive and persist under high grazing pressure and continue to be productive has been particularly impressive during the past four years, especially considering the potential adoption in mixed farming systems, according to Jason.

“We have been growing and managing a diverse mix of plants under what we would call a low management regime, which has significant on-farm adaptability,” Jason said.

*Results from the Enrich project site at Monarto in South Australia show that a diverse mix of perennial shrubs and pasture can provide significant plant and animal benefits. (Photo: Jason Emms)*

“The autumn feed gap is a limiting period for many farms, and we have been grazing shrubs from March through to June under high stocking rates, depending on the season – anywhere from 50-80 sheep per hectare.

“We then rest the shrubs for the remainder of the year, although one experiment is testing whether a twice-yearly grazing event is possible without reducing plant productivity.”

But as Jason explains, a long rotation is the key to success with such a system, as the rest period allows plants to recover between grazing events, particularly in low- to medium-rainfall areas.

“The long-term average annual rainfall at Monarto is 370 millimetres, which has not been recorded since the project started, although if this season continues as it has, 2010 might get there,” Jason said.

“But despite the dry seasons, during the past three years, the more productive shrub species are providing an average of nearly two tonnes per hectare of edible biomass per year, which is certainly more stable than annual pasture and gives farmers a predictable feed supply during the autumn feed gap.”

The more productive shrubs, which have responded well to grazing so far, include various saltbushes, wattles and *Rhagodia* species.

## Pasture performance in the mix

The performance and productivity of both the shrub and inter row pasture mix also have been monitored at the Monarto site.

## Key points

- A diverse mix of perennial native shrubs and pasture can provide significant plant, animal and environmental benefits
- Perennial shrubs are a valuable addition to the pasture system, giving farmers a more predictable feed supply during autumn
- A long rotation allows plants to recover from grazing and maintain their productivity.

Preliminary results show the shrub *Rhagodia spinescens* is responding well to grazing at Monarto, SA. (Photo: Jason Emms)

Table 1 The five most productive species at Monarto\*

Species	Edible biomass 2008 (kg/ha)	Edible biomass 2009 (kg/ha)	Edible biomass 2010 (kg/ha)
Old man saltbush	4364	1512	1432
Silver saltbush	1803	3140	1703
Mealy saltbush	2031	1463	1860
Rhagodia	1891	1401	1418
River saltbush	1599	1678	1991

\*Plants were grazed during 2008 and 2009

“Five different pasture types have been grown between the shrubs including annual medics, lucerne, volunteer annual grasses, a mix of medics and grasses and a control treatment which has no understorey,” Jason explained.

“Our research shows that companion pasture, such as the medics and grasses, are an important part of the feed system and that overall pasture growth is not reduced when pastures are grown between the shrubs.”

At the project site, 1.5-3 tonnes of dry matter per hectare of spring pasture has been produced annually, which is significant according to Jason, and in particular, the annual medics seem to be thriving when grown between the shrubs (see Figure 1).

“The results suggest that including shrubs provide a valuable and complementary addition to the feed base and do not outcompete the understorey pastures,” he said.

### Selection supports balanced diet

Another key project aim is to monitor what species the animals choose to graze when

offered a diverse range of forage species. This approach uses the animals to help guide the research.

“The results are obvious – the sheep want to consume a mixed diet and their preferences are clear,” Jason said.

“One interesting result we have observed is that a sheep’s early experiences influence their later grazing choices.”

“When we initially introduce what we call naïve sheep onto the shrubs, a particular species may be avoided the first time they see it but with increasing experience it can become a preferred species – the animals learn over time.”

Jason believes these observations could be an important management tool for farmers. For example, the green pasture between the shrub rows could be grazed during spring, using naïve sheep and a short rotation to ensure the shrubs do not get overgrazed.

“The sheep may nibble the shrubs, which is fine, but the green pasture will be preferred, leaving the shrubs for the autumn feed gap,” he explained.

### Bioactive benefits – an Australian first

As part of the overall *Enrich* project, the Monarto site was the first in Australia to provide plant material for nutritive and bioactivity analysis by its collaborating partners CSIRO Livestock Industries and the University of Western Australia (UWA).

The project is examining the potential bioactivity of many of the shrub species, including the potential for reducing methane, improving rumen function and controlling internal parasites.

Initial results demonstrate that these benefits could exist in a significant number of shrub species, which also highlights the importance of shrub and pasture diversity.

### On-farm application

The *Enrich* site at Monarto has had significant farmer interaction since the project started, with regular visits by farmer groups.

The project has also joined forces with more than 10 farmer and Landcare groups across southern Australia, which are carrying out small-scale trials to evaluate some of the more promising perennial shrub species in their own region.

“We are also in the process of developing a small *Enrich* booklet, which we expect to release during autumn 2011,” Jason said.

“The booklet will provide practical guidelines for farmers considering the inclusion of shrubs in their grazing systems.”

“It will include information on the attributes of each promising shrub species suitable for grazing, for example their protein and mineral content, production, bioactivity and animal health benefits.

“Farmers can then use this information to choose their own suite of shrubs to plant and adapt the information according to their individual farm situation and fodder requirements.”

“The information is suitable for the low- to medium-rainfall zone throughout Australia however I have had increasing interest from farmers in high-rainfall areas investigating the inclusion of perennial shrubs as potential shelter, an alternative source of minerals and potential bioactivity benefits.”

The *Enrich* project is also planning to run forums throughout Australia during 2011 to release the booklet and explain the results of the project in detail and how it is applicable to pasture systems across Australia.”

### More information

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Figure 1 Mean pasture production (±se) during spring in combination with different shrub densities

