Results prove perennials worth

Latest research shows that well managed perennials have an important place in grazing systems of south-west Western Australia (WA), according to Paul Sanford, WA Proof Site Leader for the EverGraze More Livestock from Perennials project.

"EverGraze research set out to test whether profit from Merino ewes mated to terminal sires in the high rainfall region of WA's south coast could be increased by two things; raising weaning percentage and introducing perennials into farming systems," Paul said.

"The project also aimed to improve environmental outcomes through reduced groundwater recharge and improved groundcover."

Optimum mix

The focus of the work was a 60ha research proof site located at Wellstead, 100km east of Albany. The sandy soil site receives an average rainfall of 550mm.

Before the research started, detailed computer modelling determined the optimum mix of annuals and perennials at the site, and the likely return from using perennials compared to solely annual pastures. Modelling suggested that under average seasonal conditions, the most profitable option was to use perennials on 70% of the farm. In this scenario, the model predicted that perennials would increase profits by $50/ha over annual pastures (see Table 1).

Between 2006 and 2008, researchers recorded detailed measurements of pasture production, composition, quality and persistence and animal performance at the site. This was also a period of severe drought, with annual rainfalls of 290mm, 333mm and 427mm, all well below the long-term annual average. The profitability of the perennial system (see Table 1) was modelled under three different scenarios: dry seasons, average seasons and wet seasons. (It is important to note that the economic analysis from the proof site is in broad agreement with the modelled dry season.)

Profits vary

Despite tough seasonal conditions, per head performance from the Merino ewes mated to terminal sires was high (on average, weaning 120%, weaning weights 26kg and fleece weights 4.4kg/hd greasy). However, stocking rates were lower than predicted. Stocking rates were reduced from 13DSE/ha in 2006 to 8DSE/ha in 2008 due to drought.

Table 1 presents a summary of profitability estimates completed before the field research and recent computer modelling to study the effect of season and pasture type on profit.

"Kikuyu is 'king' on the south coast of WA. It is robust, can handle set stocking, survives in dry years, provides groundcover and green feed in summer."

Pastures consisted of Whittet kikuyu, SARDI 10 lucerne, Quantum Max P summer-active tall fescue, Puna chicory and Splenda setaria-green panic. All pastures already contained a seed bank of annuals, such as sub clover. The site was grazed by Merino ewes (joined to Poll Dorset rams) that lambed in July.

"Prior to doing the field work, we predicted that perennials in an average season would increase profit by $50/ha," Paul said.

"However, under the drought conditions experienced at the site, the estimated profitability of perennials and annuals was similar.

"The benefit of perennials in a dry year is marginal. This is because the advantage they have in summer and autumn over annuals is reduced due to lack of moisture. The losses for both perennial and annual pastures in the region and limited benefits from perennials is in agreement with those experienced by farmers in the region in the last three years."

The computer model predicted that perennials were more profitable than annuals in average seasons ($36/ha) and wet seasons ($72/ha). Perennials can use the extended period when soil moisture is

Table 1 Predicted profits based on pasture and animal measurements at an EverGraze proof site, Wellstead, WA (2006–08)

	Rainfall (mm)	Pasture type	Profit ($/ha)	Profit difference as a result of perennials	Optimum % perennial pasture
Pre-experimental modelling assuming average seasonal conditions					
Average season	600	Annual	$32	—	—
		Perennial	$82	$50	70
Profit results based on modelling pasture and animal data					
Dry seasons	378	Annual	-$97	—	—
		Perennial	-$89	$8	30
Average seasons	524	Annual	$78	—	—
		Perennial	$114	$36	40
Wet seasons	646	Annual	$230	—	—
		Perennial	$302	$72	20

Sheep grazing chicory at the EverGraze proof site in WA.

adequate, whereas annual species dry off in spring regardless of rainfall.

"Based on the information that was collected at the site, we now suggest that the optimum area to plant to perennials in the region is 20–40% of the farm," Paul said.

Pasture performance

All perennials except kikuyu were rotationally grazed. Kikuyu is best managed with set stocking but species like lucerne, chicory and tall fescue must be rotationally grazed to create a critical rest period for persistence (see Table 2).

"Persistence of kikuyu, lucerne, chicory and setaria-panic throughout the trial period was excellent, despite the very dry conditions," said Paul.

"However, the summer-active tall fescue did not persist under the dry conditions, despite being spelled from grazing during summer and autumn. Tall fescue is not suited to these deep sands and variable rainfall. In contrast, tall fescue has persisted well on heavier soils with higher rainfall on the west coast of WA and at eastern Australian EverGraze sites.

Kikuyu produced 40% more dry matter than all other pastures (including the annual pastures), demonstrating its drought tolerance and ability to grow and provide 80% green feed in summer and autumn.

In 2008, lucerne had the highest production due to good summer growth. Over three years, there was a decline in the density of lucerne at the site but overall yield was maintained.

Chicory yield was lower than the most productive pastures due to a lack of companion annual species to provide winter pasture growth. Particular attention needs to be given to establishing sub clover and annual grasses to fill the winter feed gap in chicory pastures. Chicory had the highest forage quality (11.8Mj/kg) making it well suited to young stock in summer and autumn.

"The setaria-panic pasture was sown on the poorest soils and its yield was constrained by soil conditions. However, the results suggest that these sub-tropical grasses have a lower yield potential than kikuyu in this environment," Paul said.

Table 2 Pasture growth and basal cover of different perennials at an EverGraze proof site, Wellstead, WA (2006–08)

	Year	Kikuyu	Tall fescue	Lucerne	Chicory	Setaria–panic	Annual pasture
Pasture yield (tDM/ha)	2006	5.4	4.1	3.9	2.2	1.4	4.0
	2007	4.5	1.2	3.2	2.7	2.3	3.3
	2008	4.6	2.2*	5.4	2.4	2.3	3.4
	Total	14.5	7.5	12.5	7.3	6.0	10.7
Basal cover (%)							
	2006	84	3.7	1.4	2.7	1.0	—
	2007	85	0.0	0.3	2.6	4.0	—
	2008	97	4.2	0.3	2.9	5.0	—

** Resown tall fescue*

Right plant, right place, right purpose

The results from the research at Wellstead highlight the importance of matching plants to soils and landscape, and thinking carefully about what they will be used for and how they will be managed.

"Kikuyu is 'king' on the south coast of WA. It is robust, can handle set stocking, survives in dry years, provides groundcover and green feed in summer. It will respond to summer rain and suits sheep systems in the south coast," Paul said.

"Furthermore, kikuyu will maintain sheep through autumn, carry higher stocking rates and reduce supplementary feed requirements."

Paul said that lucerne provides highly nutritive feed for livestock in late spring–autumn but is only suited to particular soils (eg soil pHCaCl2 > 5) and it requires rotational grazing for persistence.

"Chicory persistence was surprising and the Wellstead experience shows it is very drought tolerant. While yield was lower than other species, it provides high quality forage and, if used correctly to finish lambs or to flush ewes prior to joining, it has a purpose on many farms in the region. The important thing is to plant chicory with a winter-active species," Paul said.

"In contrast, summer-active tall fescue was not the right plant for the region but it is suited to heavier soils in higher rainfall areas."

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More information

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