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More livestock from perennials

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Update

April 2013

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Green feed options deliver higher margins

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Flushing on green feed increases lambs born

Susan Robertson,
Charles Sturt University, NSW
Anita Morant, DPI Victoria

key points

- **Short term 'flushing' of ewes on green feed produced on average 18 but up to 21 more foetuses per 100 ewes joined when compared to ewes grazing cereal stubble.**
- **Extra foetuses were a result of 27% more multiple pregnancies. The percentage of non-pregnant ewes was the same between treatments.**
- **To achieve a greater weaning rate, appropriate management of twin bearing lambs is essential.**

Weaning more lambs can lead to higher financial returns if the increase in numbers is achieved cost-effectively. The number of lambs weaned depends on both the number of lambs born and their survival. Conception rate can be increased by increasing the number of eggs the ewes ovulate (ovulation rate). One way to achieve this is to stimulate a 'flushing' response by increasing nutrition for four to six days prior to ovulation (the critical period being days 10–14 of the oestrus cycle). Lupin grain has traditionally been used to achieve this effect as there is a low risk of grain poisoning from the sudden increase in energy.

EverGraze research at Wagga Wagga tested whether a flushing response could be achieved by grazing naturally cycling ewes on green lucerne for one week prior to joining and during the first week of joining, thereby adding value to inclusion of lucerne in the farm system. The experiment was conducted in January 2012 with adult Merino ewe flocks on two properties. Ewes grazing lucerne were compared to ewes grazing cereal stubbles which had been sprayed to kill any live plants.

Successful flushing

Ewes grazing lucerne produced an average of 18 and up to 21 more foetuses per 100 ewes joined (Table 1) when compared to ewes grazing cereal stubble. This was a 14% increase. The percentage of non-pregnant ewes was the same in both treatments (5%). This means that the extra foetuses were a result of 27% (53% versus 70%) more multiple pregnancies (Table 1). That is, ewes that would have normally carried singles were now carrying twins or triplets (although the number of triplets remained low).

How much green pasture is needed?

The response varies with quality and quantity of green pasture. Initial *EverGraze* trials with synchronised ewes suggested very low quantities were required, with most of the response occurring with as little as 350 kgDM/ha of green lucerne on offer. However, it is important that lucerne contains enough live green leaf, since mature lucerne stalk can have a similar energy content to dead grass. Live green pastures other than lucerne will also be effective. It has been found that chicory, phalaris and annual species, can also stimulate a response if they are green and vegetative.

To achieve a flushing effect, as little as 350 kg/ha green lucerne is required. Other live, green pastures can also stimulate flushing.

INSET: Flushing on green feed increased the proportion of multiple pregnancies.

ABOVE: Ewes grazing green lucerne (left) for one week prior to joining and for the first week of joining resulted in 14% more lambs born compared to those grazing dead cereal stubbles (right).

TABLE 1. Average performance of adult Merino ewes grazed on lucerne or cereal stubble in January 2012 at Wagga Wagga

	Live lucerne	Dead cereal stubble	Significant difference
Number foetus/ewe joined	1.7	1.5	P<0.05
Percentage non-pregnant ewes	5	5	
Percentage ewes with multiples (2+)	69	53	P<0.05
Start live green herbage (t DM/ha)	1 to 2	0 to 0.02	

The short two week grazing time and low levels of green feed on offer required, means that the method can be used when live green pasture is scarce.

Timing of grazing

In an autumn joined flock, ewes are within their natural breeding season i.e. cycling. Grazing the ewes one week before joining and one week into joining should see the majority (approximately 60%) of the flock flushed. Even though the risk of embryo mortality due to high pasture intake is considered quite low, the removal of ewes from green pasture after one week of joining is currently recommended.

Short-term flushing of unsynchronized ewes is unlikely to work when joined in spring/ early summer (November/December) as most ewes are not naturally cycling, although this has not been tested. Even if the grazing period were altered to fit the pattern of joining, the response is likely to be lower due to the conflict with their natural breeding season, and because they may be on or just have come off a high quality spring diet.

At what condition score does flushing have the greatest impact?

Response to flushing using lupins is variable, but appears to be the greatest in lower to moderate condition score ewes, i.e. condition score 2.5 versus 3. However, consideration needs to be given to the risk of higher mortality rates of both ewes and lambs at birth from increasing the twinning rate of ewes in low condition.

Survival is important

Flushing increases the proportion of multiple pregnancies, and can set up a greater potential reproductive rate. However, if additional lambs conceived from flushing have lower survival after birth then the benefit is reduced. The common survival rate for Merino twins is 60%.

To achieve greater benefits from flushing, management of twin bearing ewes and lambs must also be addressed to increase survival. Twin bearing ewes should be scanned and separated to ensure adequate nutrition, particularly in late pregnancy, and provision of shelter if poor weather is expected during lambing. For information on increasing lamb survival, see the *EverGraze* Lamb Survival Exchange (www.evergraze.com.au).

Who gets the green feed?

The decision to graze ewes versus other classes of stock (finishing lambs or replacement weaners) on the available green feed will depend on a range of factors such as the amount of green feed available, current conception and survival rates, the cost of supplementary feed (including lupins) and the potential finishing weights of lambs. *EverGraze* is currently working on a tool to help with these tactical decisions in a range of scenarios.

On-farm demonstrations 2013

As part of a national strategy to increase reproductive performance of sheep, the BESTWOOL-BESTLAMB project is conducting 12 on-farm demonstration sites across Victoria and NSW to validate the use of a range of green feed sources (lucerne, perennial grasses, forage brassicas) for flushing ewes. For further information on this work, contact Lyndon Kubeil lyndon.kubeil@dpi.vic.gov.au ■

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More livestock from perennials

Phalaris proves profitable in cracking clay

Peter and Regina Dooley run a mixed farming operation near Colac in south-west Victoria. The soils on their basalt landscape vary from loams to heavy, cracking clays, with some rocky areas.

EverGraze supporting site

- **Producer:** Peter and Regina Dooley
- **Location:** Warncoort, Victoria
- **Property size:** 818 ha
- **Mean annual rainfall:** 600 mm
- **Soils:** Basalt country with loams to heavy clay soils and some rocky areas
- **Enterprise:** Cereal cropping (canola, red and white wheat, barley and linseed), prime lambs, dairy heifer agistment.

Jane Court and Raquel Waller, DPI Victoria

Low lying areas have heavy, black, sodic soil that is dispersive and poorly structured. Waterlogging and salinity are a problem in these parts.

This country performs well when sown to annual ryegrass, but the Dooleys were looking for a productive perennial pasture system to reduce the workload at busy times when labour is required for their cropping enterprise. They also wanted to avoid the need to re-sow pasture every year, especially after a wet summer when the ground is difficult to sow into.

The Dooleys were therefore keen to host an *EverGraze* Supporting Site to see if perennial pastures could be established and made to persist on areas with these difficult soils.

Lamb production

Prime lamb production is the main enterprise on the Dooley's property 'Brolga', supplemented with dairy heifer agistment and about 200 ha of cereal cropping.

"We currently run 2000 breeding ewes, made up of 1400 Coopworths and 600 Coopworth-Merino first crosses," Peter said.

"We buy in all replacement ewes and join our best ewe lambs from each flock at eight months of age. All the Coopworth ewes are joined to Coopworth rams for six weeks, and the first-cross ewes are joined to Dorset rams for about 10 weeks.

Lambing occurs in mid-July. We usually achieve a weaning percentage of about 135% across the ewe lambs and older ewes. All our lambs are sold as terminals, starting with about 60% being sold as suckers when they are 4–5 months old, with the remainder weaned and sold between December and April."

Pasture base

Over the years, the high performing lamb production system combined with good grazing management has justified the routine establishment of improved perennial pastures. Most of the pastures on the property are phalaris and ryegrass based, with various clover species also in the mix.

In an intensive rotational grazing system, stock are shifted onto fresh pasture anywhere between once-a-day to once-a-week depending on the growing conditions.

Paddocks are rested for up to 70 days during winter and summer, with shorter

BELOW: A crust formed on the surface after receiving 30 mm of rain just after sowing. The phalaris seedlings struggled to get through this crust, but the perennial ryegrass did not.

RIGHT: Phalaris eventually established well in the difficult soil conditions.

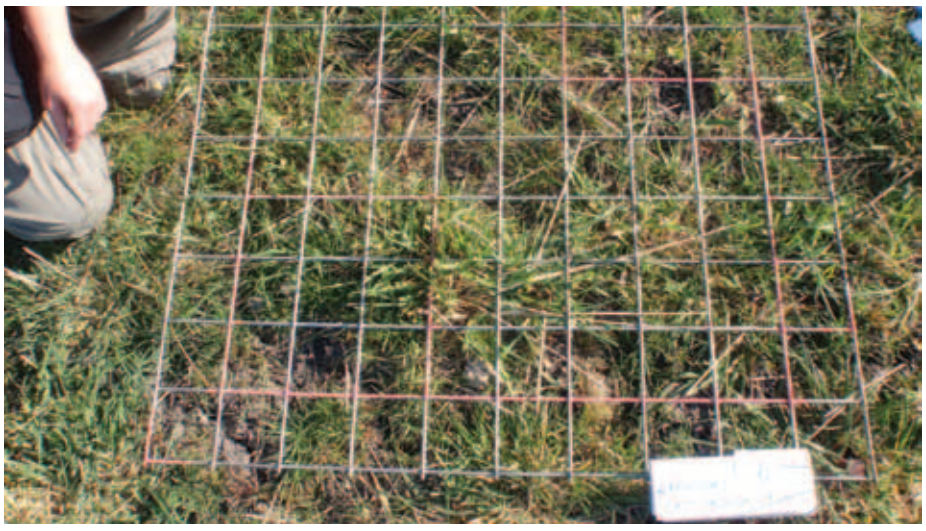

TABLE 1. Species and rates sown in innovation paddocks during April 2009

Initial treatments	Species and variety sown	Rate sown (kg/ha)
Phalaris/clover	**Winter active phalaris**	**6**
Spray-topped October 2008 with glyphosate	Strawberry clover	0.5
Disced and harrowed summer and autumn.	Mid-season flowering sub clover	5
2.5t/ha gypsum and 45kg/ha phosphorus harrowed in April 2009	Balansa clover	0.25
Perennial ryegrass/clover	**Mid-season flowering perennial ryegrass**	**15**
Spray-topped October 2008 with glyphosate	Strawberry clover	0.2
Disced and harrowed summer and autumn.	Mid-season flowering sub clover	5
2.5t/ha gypsum and 45kg/ha phosphorus harrowed in April 2009	Balansa clover	0.25

rotations when it's growing in autumn and spring.

"I generally end up applying about 200 kg/ha single super to most of the grazing paddocks each year in response to soil test results, and this combined with the grazing system allows us to carry up to 18 DSE/ha on the better areas of the farm," Peter said.

Supporting Site

While perennial pastures usually establish and persist well over much of the property, there are about 140 ha with heavy, black, sodic, cracking clay soils which are prone to waterlogging and salinity. It was in one of these areas that the 32 ha *EverGraze* Supporting Site was established.

In the past, the site was regularly sown to annual ryegrass, as this was the only pasture Peter believed would germinate easily in the tough conditions.

"These pastures would give us some grazing in autumn if there was an early break, but often none over winter as they became too wet. We would then cut it for hay during spring and feed it out elsewhere on the property as needed," Peter said.

The Supporting Site was split into two 16 ha innovation paddocks.

Gypsum was applied to counteract the excessive sodium in the soil and prevent soil surface crusting, enabling seeds to germinate successfully.

Phosphorus was initially applied to both paddocks to raise the Olsen P level from 7 to 12 mg/kg.

The aim for the first treatment was to use the phalaris as a deep-rooted perennial that would prevent the soil from getting waterlogged and could tolerate the dry, cracking clay over summer and autumn.

The second treatment was sown using the same clover species but with a mid-season flowering perennial ryegrass (Extreme AR37). This mix is much more typical for this district, and is recommended for 400–700 mm rainfall areas

A slow start

Site co-ordinator Raquel Waller reported that during the first year of the Supporting Site, the phalaris establishment was lower than ideal at 11.6 plants per square metre, rather than the 16–20 plants/m^2 they were hoping for.

"In contrast, the level of perennial ryegrass establishment was quite good, and there was a significant amount of annual ryegrass across the two paddocks," Raquel said.

The site received 30 mm of rain just after sowing which meant a crust formed on top of the soil in these paddocks. The phalaris seedlings struggled to get through this crust, but the rye didn't have this problem.

Performance comparisons

Once it got going, Peter was particularly happy with the performance of the phalaris, which has grown well, established large individual plants and has reliably sent out new tillers, particularly in later years.

Despite the soil improvements made to the site, tests and observations show the soil continues to have low fertility, poor structure and remains sodic, all of which could be reducing the productivity of the perennial ryegrass. Olsen P remains below the target of 12 mg/kg. This combined with poor soil structure due to the low calcium:magnesium ratio, and high sodium causes dispersion in the soil, limiting the movement of air and water around the plant's root zone.

Feed availability

The amount of grazing achieved from each paddock in the Supporting Site was similar, despite the different characteristics of the two perennial species.

The ryegrass had good plant numbers but was only productive during spring. The phalaris had fewer plant numbers and was slower to establish and reach full production, but had a longer growing season than the perennial ryegrass, providing feed from autumn to spring once established.

Peter believes both Supporting Site paddocks now have the potential to carry about 6-7 ewes/ha, with the phalaris slightly higher than the ryegrass. If one ewe is 2 DSE, this equates to 12–14 DSE/ha compared to the 5–6 DSE/ha this area could carry previously.

Low legume survival

Peter was disappointed at the clover content in each paddock, which remained at less than 5% at each of the annual composition counts and performed poorly throughout the year.

"Crickets may have contributed to the disappointing performance of the clover," Peter said. "I baited each year, with mixed results. The only year that the costly baiting suppressed the crickets and allowed the legumes to survive was 2012."

In addition to the cricket damage, soil-related factors undoubtedly contributed to the poor performance of the clover.

Less cracking with phalaris

Another interesting result Peter observed at the Supporting Site was the difference in the amount of soil cracking that occurred between the ryegrass and phalaris paddocks.

"Each summer the site develops deep and wide cracks, causing issues for management. But during 2012, the ryegrass paddock cracked as usual, while the phalaris paddock did not," Peter said.

"From our observations, this may be because the ryegrass dried out the surface moisture preferentially, causing the soil to tense and open up, whereas the phalaris is more uniform in where in the soil profile it draws moisture from."

(Continued from page 5)

Lessons learnt

Peter was very happy he tried the phalaris and perennial ryegrass on this difficult soil site, and says he has learnt a lot from preparing the paddock and from the species comparisons.

"The phalaris undoubtedly provided feed for longer and was more productive than the perennial ryegrass in the Supporting Site." Peter said. I am sure it is the most suited pasture species for our property and will form a highly productive and persistent pasture once established.

We are now progressively sowing about 40–60 ha of the property to phalaris and sub clover each year."

Improved establishment

In recent years, Peter has been trialling and refining a method for establishing phalaris in this country. By spraying, smudging and then sowing annual rye in the first year with a follow-up light smudge in the second and third years, an even, weed-free tilth is created for phalaris establishment in autumn of the third year.

"We have found less cultivation is better, so we prepare the site for phalaris sowing by lightly tickling the top five or so centimetres of soil with a multi-disc," Peter said.

The annual rye provides a bulk of feed quickly and lasts for two years if allowed to set seed. Pastures established using this method are carrying 18 DSE/ha.

Peter may drill perennial ryegrass into these new pasture paddocks once the phalaris is established, and may also try other phalaris varieties or a tall fescue in the future.

Crunching the numbers

Cumulative net cash flows and estimates of return on capital invested were used to assess the affordability and value of the pasture improvement. Establishing phalaris successfully in this challenging country cost at least $600/ha plus the cost of purchasing the extra stock to utilise the feed. Despite the high cost, productivity lifted from 5DSE/ha to 12–18 DSE/ha. This gave an estimated Return on Capital of 14% when establishing phalaris in the first year and up to 26% when using Peter's establishment technique of sowing annual ryegrass in the first year and using less intensive cultivation.

■ ***A full version of this case study can be found on the* EverGraze *website: www.evergraze.com.au***

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Optimum prime lamb production systems for south-coast WA

Livestock systems based on fertilised annual pastures on the south coast of WA face a number of challenges in achieving profitability and resilience. Some of these include; seasonal variation resulting in dry seasons and high supplementary feeding costs – especially in recent years; wind erosion associated with poor ground cover on light soils; and salinity associated with leakage of water below the root zone.

Research at the *EverGraze* Proof Site near Wellstead WA investigated the inclusion of summer-active perennials grazed with a high performance Merino-based prime lamb enterprise for increasing profitability and resilience.

The Proof Site results demonstrated that kikuyu, panic grass and chicory were persistent and could address one or more of the above challenges. In addition, the Merino ewes consistently weaned 120%. However, given that the site only tested one system at one location with a limited range of management, the local *EverGraze* Regional Group asked the following questions;

1. What combination of management practices results in the most profitable Merino based prime lamb production system?
2. How profitable is the system based on perennials and a Merino-based prime lamb enterprise in a 300 mm and a 600 mm annual rainfall environment?

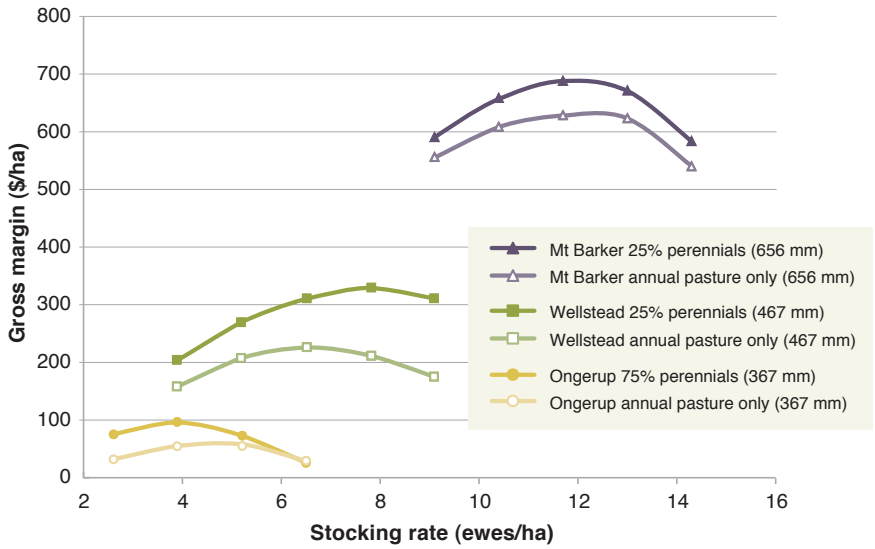
The research team investigated these questions for the Wellstead Proof Site (467 mm) and two additional locations at Ongerup (367 mm) and Mt Barker (656 mm), using GrassGro modelling. The variables included;

1. Proportion of the whole feed base that is perennial
2. Proportion of ewes carrying twins
3. Time of lambing
4. Stocking rate
5. Number of days ewes were locked up on kikuyu in autumn.

Some assumptions

The analysis included the perennials lucerne, kikuyu and summer-active tall fescue. Summer-active tall fescue was used in the simulations as a generic summer-active grass, but was shown not to persist at Wellstead, and is also unlikely to persist at Ongerup. The model was rigorously validated for Wellstead using the Proof Site data however this did not take place for Ongerup and Mt Barker so these results should be assessed more cautiously.

FIGURE 1. Gross margins at various stocking rates for the most profitable perennial systems compared to a system based entirely on annuals at three locations.



Initial modelling consistently showed that gross margin (GM) increased in a linear fashion with more twin lambs, so all simulations were run with 50% singles and 50% twins to wean 120% (achieved at the Proof Site).

Twenty-five percent perennials at Wellstead

For Wellstead, the modelling suggested that 25% of the farm sown to perennial pastures will provide the highest long term GM, increasing by around 44% compared to an annual system (Figure 1).

The modelling showed that lambing in May and holding the ewes on kikuyu in the autumn could lift the optimum stocking rate from 6.5 to 7.8 ewes per ha and GM's from $229 to $329 per ha. Presumably, this was a result of May lambing providing the best match between feed supply and animal demand; and kikuyu to some extent filling the autumn feed gap. It must be noted however, that moving from 6.5 to 7.8 ewes per ha increases the risk of financial loss in some years and it is therefore recommended that risk adverse producers aim for 6.5 ewes per ha.

More perennials for low rainfall

Using the model to assess the performance of the different pasture systems in a lower rainfall environment at Ongerup proved interesting. Counter to expectations, a higher proportion of perennials in the pasture base proved to be the most profitable. A system with 75% perennials, May lambing and 30 days locked on kikuyu returned the maximum GM of $96 per ha, at a stocking rate of 3.9 ewes per ha. This was a 66% increase in GM compared to the highest GM annual system. It is likely that as a consequence of annuals having a shorter growing season, perennial species, while not yielding more, will lengthen the supply of feed to such an extent they provide substantial benefits to livestock performance and reduce supplementary feed requirements. In addition, there are likely to be more years in this environment in which annual pastures fail and perennials such as kikuyu provide some degree of drought proofing.

Ten per cent profit increase for high rainfall

The Mt Barker simulations prove that prime lamb production in a high rainfall environment is potentially highly profitable on annual pastures alone ($628 per ha per year). However, lifting the summer-active perennial component in the system to around 25 to 75% of the feed base can increase GM's to between $659 to $688 per ha per annum, which equates to an increase of between five and 10%. The change is more modest at Mt Barker because the annual pasture system is already fairly productive, particularly in spring and into early summer. The out of season growing period for perennials is shorter which also lessens the magnitude of their impact. The optimum stocking rate at Mt Barker is around 11.7 ewes per ha.

Species selection

Unfortunately this analysis provides no insights into which of the three perennial species modelled, kikuyu, lucerne and tall fescue, provided the largest increase in GM. Based on historical field research on the south coast, kikuyu has been the most effective perennial in reducing supplementary feed due to its ability to provide green feed in summer and also in autumn prior to the break. ■

Kikuyu (left paddock) plays an important role in the south coast perennial systems, maintaining sheep in dry autumns while protecting soils from wind erosion, compared to annual pasture (right paddock). INSET: Kikuyu root systems bind soil and develop organic material for growth.

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- **New stocking rate calculator**

Determines DSE/ha per month for comparison with district benchmarks. Helps assess how well stocking rate is matched to pasture production.

- **Updated Feed Budget Rotation Planner**

Calculates feeding requirements and costs to meet weight and condition targets. Pasture budgets assist with stocking rate adjustments and management options.

- **Feed On Offer (FOO) guide for lucerne and chicory**

This guide helps users estimate the Food On Offer (FOO) of chicory and lucerne pastures to assist with feed budgeting.

To download these tools go to www.evergraze.com.au/tools.htm