Perennial ryegrass management
VII. Pasture renovation

This Information Sheet deals with the decision process leading to the renovation or oversowing of perennial ryegrass pastures on southern Australian dairy farms. The focus of this Information Sheet is on:

1. Monitoring and assessment of pasture stands.
2. Decision criteria to choose renovation or an alternative.
3. Oversowing.
4. Full renovation.

Key points

- Objective assessment of pasture leads to more informed decisions about renovation.
- Decisions about pasture renovation should be based on recent paddock performance and the chance of the pasture recovering, taking into account the role of the pasture in the dairy system.
- In Project 3030, oversowing perennial ryegrass with more perennial ryegrass was more successful than oversowing with Italian or hybrid ryegrass.
- A full renovation program should not only take into account sowing the new grass but also address the temporary feed shortages that are caused by slow establishment of perennial pastures. Forage cropping may help to address this.

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1. Monitoring and assessment of pasture stands

Objective assessment of the pasture will detect changes in species composition and ground cover over time. This will lead to more informed decisions about paddock renovation.

The recommendation from the 3030 Project is to monitor paddocks in winter, spring and again in summer in order to rank paddocks based on the sown species content in the pasture, the paddocks recent performance and density of weeds. Table 1 describes the assessment process.

Table 1. What and how to monitor pastures to detect changes in species composition over time.

What to monitor	How to monitor
1. Visual assessment of sown species: a) % of sward DM b) ground cover c) homogeneity ('evenness') across paddock	a) Look at 1 m^2 of pasture, estimate what proportion of the DM is the sown pasture species. b) Measure the distance of bare ground between pasture clumps. c) Walk diagonally across the paddock and observe if a) and b) are uniform across the paddock or if they are associated with soil conditions, stock camp areas, etc.
2. Recent performance / production of the paddock.	Calculate the number of grazings + silage cuts in the past year (if records available).
3. Presence and density of weeds.	Identify any species that is not ryegrass (e.g. winter grass, Poa annua, or annual summer grasses). Estimate the weed density (% DM) in 1 m^2 (can be done at the same time as step 1).

Ideally, make the assessment when a paddock is to be grazed within the following week. Immediately after grazing or in the early stages of re-growth, the percentage of species in the sward can be distorted by the cows' selective grazing (i.e. the proportion of unpalatable weeds just after grazing will appear higher than before grazing).

2. Decision criteria to choose renovation or an alternative

There is no general rule about when to renovate a pasture that can be applied to all situations (e.g. renovate the paddock if there are fewer than X plants/m^2) because there are many variables, including climate and soil type. The decision to renovate, choose another pasture improvement alternative, or do nothing will consider the results of the monitoring system described in Table 1 and must be made in the context of the whole dairy system. The decision should balance:

1. Maximum area to be renovated each year: Production in the first year of a fully renovated pasture is lower than in an established pasture. This lower level of pasture production creates a 'feed gap' on the farm, particularly in autumn, that effectively limits the area that can be renovated each year.

There are options that can be used to manage the 'feed gap' created by pasture renovation. These include having a double cropping renovation plan to provide home-grown feed during the feed gap and splitting areas for renovation between autumn and early spring sowings.

2. Paddock performance: Select paddocks that have severely underperformed in the last year.

3. Chance of recovery: If there is a chance to get a paddock to perform to its potential without renovation this should be the first choice. This will avoid the higher costs of oversowing or full renovation and the production lag time associated with the newly sown pasture.

Examples of when renovation could be avoided are paddocks with an adequate stand of perennial ryegrass but low tiller density due to a high broadleaf weed infestation. A planned herbicide application and fertiliser program could get them back on track. If a paddock has a satisfactory plant density but low performance due to soil restrictions, test the soil and correct pH and/or increase soil nutrient levels as necessary.

4. Role of original pasture: The decision to fully renovate or oversow should take into account the role of that paddock in the dairy system as a whole.

The first step is to consider if the current grass species or cultivar suits the environment (soil, rainfall and temperature) and feeding strategy. If it does, consider oversowing with the same seed. If it does not, plan to fully renovate the paddock to a new pasture species or cultivar.

There is little point in oversowing with an annual grass to postpone the renovation to the next year (unless a spring sowing would be beneficial and the annual grass is meant to fill the autumn–spring gap).

However, a situation when oversowing with an annual grass might be required is when the target maximum area for renovation has been reached and there are still underperforming paddocks. Oversowing can allow paddock performance to be boosted before being fully renovated in the following year.

5. Feasible sowing date: Across the different regions, and even within one farm, there are environmental factors that restrict when pasture can be sown. The most important ones are soil moisture and temperature.

At the 3030 Project partner farm near Colac, in south-western Victoria, the 20th of March was determined to be the start of the pasture sowing window. In southern parts of south-west Victoria effective rainfall can be expected from late March onwards and it is unlikely to be hot (>35°C). On this farm in 2007, 30 mm of rain was forecast for the end of April so, in February, it was decided that sowing should be completed by the end of March. In this case, the sowing was done in dry conditions.

Table 2. The decision process in the 3030 Project partner farm at Colac after paddocks were assessed in February 2007.

Paddock	Status	Decision	Action
A	Good tiller survival and density and few weeds.	No renovation or oversowing required.	• Monitor for capeweed and barley grass. • Spray if required 5–6 weeks after autumn break. Spell pastures for a month and spray for barley grass if required. (More frequent spraying for weeds will stunt the growth of perennial ryegrass.)
B	Reasonable tiller density but weedy in stock camp areas.	Partial oversowing of perennial ryegrass.	• A cross drill at 15 kg/ha perennial ryegrass each way. • Spray program to kill weeds in stock camp areas.
C	Solid perennial ryegrass base but with gaps greater than 10 cm occupied by broadleaf weeds.	No renovation. Spray to control weeds, but this will also set back the growth of perennial ryegrass.	• Spray program to kill broadleaf weeds: 250 ml/ha of glyphosate, 1 L/ha of 2,4-D and 450 ml/ha of dicamba .
D	A weedy pasture with few ryegrass tillers.	Fully renovate the paddock.	• Spray program to kill pasture: 3 L/ha glyphosate and 1 L/ha 2,4-D. • A light harrow of paddocks followed by cross drill at 17 kg/ha each way.

An example of the paddocks assessment and decision process on this farm in February 2007 is shown in Table 2.

On the 3030 Project farmlets at Terang, in south-west Victoria, the implementation of the renovation process was planned according to the following conditions:

- Any renovation or oversowing was to be done in autumn unless the paddock was to be used for a summer crop, in which case the full renovation process began in spring.
- The only exception was made for winter-sacrifice areas where it was possible to oversow an annual ryegrass for spring feed and/or silage.
- All perennial ryegrass seed used contained novel endophyte.
- Oversowing rates for perennial ryegrass were 20–25 kg of seed/ha (sown with DAP at 100 kg/ha) and the re-sowing rate used for perennial ryegrass was 25 kg/ha.

3. Oversowing

Oversowing was used in the 3030 Project farmlets at Terang where undesirable species could be controlled without a full renovation and where seedling vigour of drilled species was expected to compete with existing plants in order to:

- increase plant numbers within an existing sward
- fill open spaces to avoid weed invasion.

Oversowing perennial ryegrass with more perennial ryegrass was more successful than oversowing with Italian or hybrid ryegrass (Table 3). There was no evidence to suggest that oversowing with Italian or hybrid ryegrass in autumn improved substantially the annual amount of pasture harvested compared to oversowing with perennial ryegrass.

When oversowing paddocks, direct drilling is generally preferred to broadcasting to ensure good seed-to-soil contact. Oversowing rates for perennial ryegrass of 20–25 kg/ha are recommended.

Sowing rates for annual ryegrass are recommended at 40 kg seed per ha. Increasing the sowing rate from 20 kg/ha to 40 kg/ha (total cost = ~$100/ha) showed an additional 0.9 t DM/ha consumed (J.Jacobs, unpublished). The sowing rate did not affect the distribution of DM production during the growing season (from June to early November).

4. Full renovation

Full renovation is the complete removal of all previous pasture plants by either spraying followed by direct drilling pasture seed or spraying and then cultivating before sowing.

Successful renovation of perennial ryegrass may take more than 12 months (from the point when the previous pasture is cultivated or sprayed to the time when the newly sown pasture is fully established and producing to its potential).

A full renovation program should not only take into account sowing the new grass but also address the temporary feed shortages that will be caused by the typically slow establishment of perennial pasture species. This is demonstrated by the lower yields of first year resown pastures in the RyegrassMax farmlet in the 3030 Project at Terang (Figure 1). However, in the second and third years the renovated pastures were more productive than the old pastures (this difference was small in 2006 because of an extremely dry spring).

Table 3. Annual pasture harvested (t DM/ha) from perennial ryegrass (PRG) pastures non-oversown and oversown with perennial ryegrass, Italian or hybrid ryegrasses over three years in the RyegrassMax and Complementary forages 3030 Project farmlets at Terang. The number of paddocks measured is sown in brackets.

	Pasture harvested (t DM/ha)					
	Ryegrass Max			Complementary forages		
	2006/07	2007/08	2008/09	2006/07	2007/08	2008/09
PRG—non-oversown	6.4 (18)	8.2 (12)	8.4 (17)	8.2 (8)	10.0 (7)	8.4 (11)
PRG—oversown with PRG	8.0 (2)	9.9 (8)	6.0 (2)		11.9 (2)	5.1 (2)
PRG—oversown with Italian ryegrass				7.4 (5)		
PRG—oversown with hybrid ryegrass					10.3 (4)	

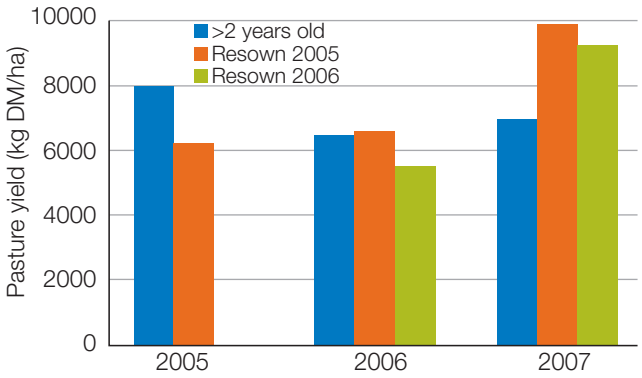

Figure 1. Average annual pasture harvested (kg DM/ha) from perennial ryegrass based established pastures (>2 years old), and pastures resown in 2005 and 2006 in the RyegrassMax farmlet of the 3030 Project at Terang.

In practice, the first-year feed gap is more likely when the pasture is sown in early autumn than in spring, since the typical peak of pasture growth during spring tends to dilute the impact of having paddocks under renovation.

To fill the autumn feed gap, forage cropping can be incorporated into the system. Options include grazable forage crops such as brassicas that have the greater growth rate potential than grass species in autumn (forage rape, kale or hybrid brassicas; see the 'Regrowth brassicas' Information Sheet for details) or the use of silage.

Another alternative tried on-farm as part of the 3030 Project was the direct drilling of perennial ryegrass into a chicory sward (sown in the spring as part of the renovation plan). The chicory is compatible with ryegrass during the establishment period and can provide more feed at the first grazing of the new sward than a pure ryegrass sward (see the 'Chicory' Information Sheet for details of chicory management and mixes).

Another factor to be considered when planning the renovation of a permanent pasture paddock is the store of naturalised weed seeds in the soil. A study by Callow et al. (2005) in four states (New South Wales, Western Australia, South Australia and Tasmania) highlighted that a large seed store can lead to pasture failure.

A practical response is to spray but not sow until 10-15 days later to give the weeds the opportunity to emerge. If weed germination is abundant and cannot be controlled with selective herbicides within the sward, the better option is to sow an annual species. The paddock can be sprayed again in the spring and summer to exhaust the seed bank before the next autumn.

References

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See also

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About 3030

PROJECT 3030 aims to help farmers achieve a 30% improvement in farm profit by consuming 30% more home-grown forage (pasture plus crop). It is aimed at dryland farmers in southern Australia who have mastered the challenge of growing and using ryegrass pasture for dairy-cow feeding.

For further information

Contact Dairy Australia
T 03 9694 3777
E enquiries@dairyaustralia.com.au
W www.dairyaustralia.com.au

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