Perennial ryegrass management

IV. Grazing management specific practices

Key targets

This Information Sheet focuses on paddock-level specific grazing management practices. These practices should be understood within the context of the three basic strategies identified by the 3030 Project as the basis for pasture management (discussed in the 'Grazing management to maximize growth and nutritive value' Information Sheet). The 'ABC targets' are:

A. Graze between the 2nd and 3rd leaf stage.

B. Leave a post-grazing residual of 4–6 cm between pasture clumps [equivalent to 1,500–1,600 kg dry matter (DM) per ha].

C. Maintain a constant cover of green leaf area all year.

The other Perennial ryegrass management Information Sheets in this series focus on the principles and practices that apply to the decision process and overall pasture management on a dairy farm. This one describes some practices that might be required in particular circumstances to achieve the more general objectives described in the other Information Sheets.

The practices or techniques discussed here are:

1. Late-autumn and winter cover management.
2. Grazing management on wet soils.
3. Topping pasture before grazing.
4. Summer post-grazing residuals.

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1. Late-autumn and winter cover management

In the generally hot and dry summers in southern Australia when perennial ryegrass growth is minimal, the timing of the start of the grazing rotation in autumn is an important aspect pasture management. This timing has a large impact on the pasture cover during late autumn and winter.

A common practice in the region has been to start grazing as soon as some growth is observed but this normally leads to low pasture covers during winter and reduced potential for growth in the following spring.

The practical rule adopted by the 3030 Project farmlets at Terang was to not graze in autumn until the pre-grazing cover reached 2,400 kg DM/ha, and only if the predicted growth rate was enough to sustain a rotation (i.e. enough paddocks are likely to become eligible for grazing over the next period of time). This practice aimed to maintain the target rotation length from that point in time onwards, with paddocks to be grazed consistently at the 3rd leaf stage through winter. In the 3030 farmlets this meant being able to reach an average rotation length of 45–48 days throughout early to mid-winter.

A specific management practice applied on the 3030 farmlets at the start of the autumn was to assess pasture cover and density across the farm and identify one third of the area as the first paddocks to be grazed. Nitrogen fertiliser was applied to the other two-thirds of the area that was to be grazed later. This was done to boost growth rates to get these paddocks into the grazing rotation as soon as possible.

Figure 1 gives an example of when it is premature to start grazing. In this example, there are two paddocks ready to graze but it is likely that there will be a gap after grazing these paddocks before the following paddocks reach ~2,400 kg DM/ha (assuming equal size of all paddocks). Information on likely growth rates over the following 2–3 weeks is implicit in the decision.

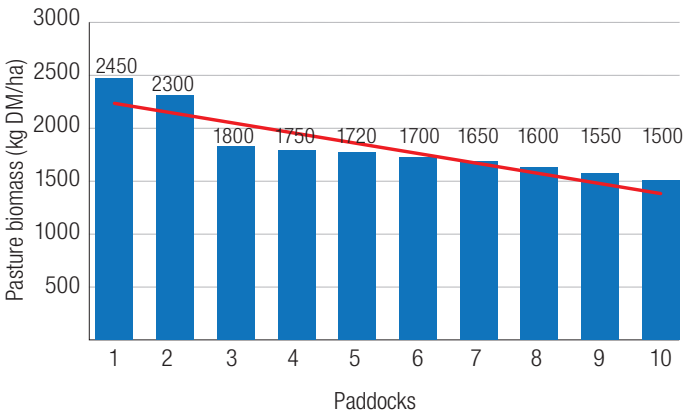

Figure 1. Example of pasture wedge of a dairy farm in autumn when it is too early to start the grazing rotation.

Take particular care in assessing paddocks that have been recently oversown or re-sown. Before these paddocks can be grazed, additional factors have to be considered: first, if new ryegrass plants are vulnerable to being pulled by grazing and, second, if the ground is firm enough to prevent pugging.

2. Grazing management on wet soils

Extended periods with saturated soils (waterlogging) during winter are common on dairy farms in southern Australia. Although these conditions cannot be avoided completely, efforts should focus on minimising the pugging damage to the pasture. Pugging can impact on the profitability of the farm through decreased pasture productivity and tiller density, cows' milk production and/or body condition, incidence of mastitis and increased soil compaction and structural damage.

There are different practices to reduce the susceptibility of soils to waterlogging. One example is the sub-surface drainage technique that has been evaluated in the Gippsland region (see Ward et al., 2003). This Information Sheet focuses on the practices related to grazing management when waterlogging conditions are already present.

In the 3030 farmlet experiment at Terang, grazing management in wet conditions aimed to avoid pug damage to soil and pastures, but maintain pasture intake as much as possible. Three levels of management actions were implemented, depending on the extent of the waterlogging:

1. If available, graze areas that were not at risk of pug damage. For example, the paddocks with sub-surface drainage.
2. If no paddocks were free of pug damage risk, a small number of waterlogged paddocks were selected and grazed more quickly (by increasing the allocation, effectively shortening the rotation length). This approach resulted in post-grazing residuals above the target for that particular area and for a couple of weeks. However, particular care was taken to graze these paddocks down to the target level once the conditions were back to normal. If the conditions remain wet for a considerable time (i.e. longer than the number of days in the rotation length) this strategy to reduce rotation length is likely to be risky as it will lead to multiple grazings on a 'short rotation'.

   On the grazing area, back fencing is recommended if grazing the same paddock for more than two days, to avoid cows back-tracking over the previously grazed areas, which increases the chances of damage to soil and plants.
3. If wet conditions were expected to be prolonged, a restricted time ('on-off') grazing strategy was implemented to protect soil and pasture against damage. This technique minimises the non-grazing time cows spend in the paddock. This idea is based on the fact that a larger proportion of the pugging damage is done by cows once they have finished grazing, as they go searching for clean pasture or seek shelter from the rain or wind.

On-farm evaluations of restricted time grazing by Ward et al. (2003) and Christie and Watson (1996) in south-west Victoria have estimated that there was 1–1.5 t DM/ha less pasture utilised over the grazing season when grazing was restricted to four hours compared to grazing eight hours or more. Christie and Watson showed that a 4-hour grazing period allowed the cows to achieve about 80% of the total pasture intake (from a total of 10 to 12 kg DM/cow/day achieved in a 12-hour period). In both cases, grazing for only two hours did not show considerable advantages in pasture regrowth and tiller density after the pugging

conditions, while it restricted pasture intake much further to about 70% of the total achieved within eight hours. Importantly, because these results where obtained with cows targeting a high DM intake of pasture (10–12 kg DM/cow/day) it can be hypothesised that an even higher proportion of the total intake could be achieved within a restricted time if the target intake was lower (e.g. 5–6 kg DM/cow/day). In addition, these results do not take into account the reduction in future growth or density caused by the greater pugging in the 8-hour grazings.

To achieve high intakes with restricted grazing time a key factor is the pre-grazing cover. Cows have a maximum number of bites per unit of time (60–75 bites/minute) so each bite has to be large if the expected intake is to be achieved in a restricted grazing time. From the pasture perspective, the variable that controls bite size is pasture cover. This means that, to be able to achieve an intake closer to 7 kg DM/cow/day, a minimum pre-grazing cover of 2,200 kg DM/ha should be present.

Because cows require time to adjust to a new regime when grazing is restricted, if the changes are only applied for a short time (one week or less) there will be an impact on DM intake and milk production. This was found in behavioural studies in New Zealand (DairyNZ, 2010a, b).

When they are not grazing, cows could be on a feed-pad, a stand-off area or a sacrifice paddock. A feed-pad or stand-off area should be able to handle both feeding with low wastage and cows standing as long as 12 hours or more (from which they should be able to lie down comfortably for about eight hours). The sacrifice area could be a non-productive area (sand bank, unused road, etc.) or a paddock due to be renovated. The recommended practice with a sacrifice paddock that has some pasture cover is to strip-graze it in order to offer a small allocation of fresh pasture each day and, if practicable, feed silage/hay underneath the electric fence.

Information about management options for pasture renovation and soil recovery from pugging damage is provided in the 'Pasture renovation' Information Sheet of this series.

Information on management of animal health, welfare, milk production and feeding on wet conditions is available in the 'Managing in wet conditions' section of the Dairy Australia website (http://www.dairyaustralia.com.au/Standard-Items/News/Dairy-News/Managing-in-wet-conditions.aspx).

3. Topping pasture before grazing

Achieving a target post-grazing residual without restricting DM intake (DMI) becomes more difficult with high levels of pre-grazing cover. It is even more difficult when the increased pre-grazing cover is linked to ryegrass plants reaching the reproductive phase. Pasture topping is a management option that can help to control post-grazing residuals.

There is a 'recoverable' range of pre-grazing cover we can move without much effect on post-grazing residual levels or restricting DMI. At higher levels of pre-grazing cover (which varies with time of the year and pasture density) post-grazing residuals will tend to increase regardless of grazing intensity. See the 'Grazing management to maximize growth and nutritive value' Information Sheet for details of why it is important to achieve a target post-grazing residual.

Once the post-grazing residuals increase across the farm, the challenge is to be able to regain control of the post-grazing levels without compromising milk production (i.e. not 'pushing' the cows to go hungry in order to graze harder).

During the 3030 farmlet studies at Terang the effect of increased levels of pre-grazing cover on the subsequent post-grazing residuals was observed in the first year of the study (Figure 2). The difficulty in maintaining low post-grazing residuals in this initial year was associated with factors related to establishing the experiment. However, it is a good example of what often occurs in commercial dairy farms where increased pre-grazing covers lead to high post-grazing residuals; once this occurs it takes time and effort to regain control. Figure 2 also makes clear that in years two and three of the farmlet study, this problem was corrected, as the management was adjusted to set the rotation length according to leaf emergence rate more strictly. Topping was one of the practices that helped maintain post-grazing levels at ~1,500 kg DM/ha, particularly when pre-grazing was as high as 3,000-3,500 kg DM/ha (Figure 2).

Rotation length management leads to better control of pre-grazing cover levels, and together with correct allocation, helps achieve the desired target post-grazing residuals. However, allocation inaccuracies or abrupt climatic changes can always occur, leading to higher than desired pre-grazings and/or an increasing proportion of reproductive stems in the pasture. When this happens, and the target post-grazing residual will difficult to achieve, consider pre-grazing mechanical topping of pasture.

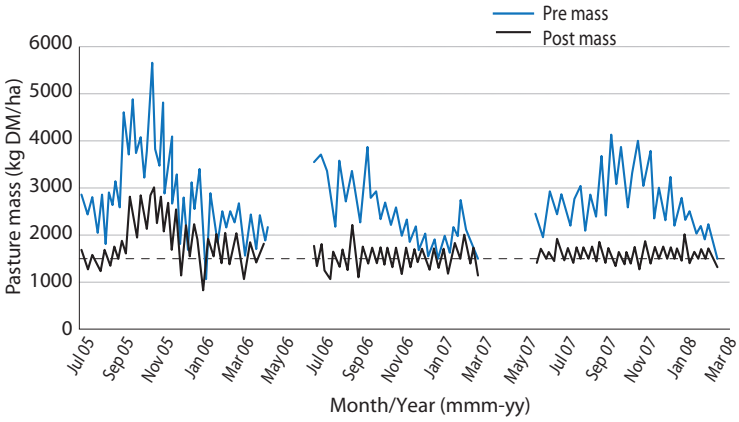

Figure 2. Pre-grazing cover (blue) and post-grazing residual (black) measured at the RyegrassMax farmlet in 2005/06, 2006/07 and 2007/08 of the 3030 Project farmlet study at Terang.

For pre-grazing topping to be successful it should be viewed as a preventive practice to stop the full elongation of the ryegrass stems. The objective is to cut the stem while it is a low proportion of the plant and is reasonably digestible. The pre-grazing topping should start before the date when silage is being made and finish by the end of the next grazing rotation. The aim is that within one grazing rotation most, if not all, of the pasture paddocks will be cut by topping or cut for silage.

It is important to distinguish between when pre-grazing topping is needed and when there is a genuine pasture surplus. As described in the 'Practical application of grazing principles' Information Sheet, a genuine pasture surplus is the result of pasture growing at a rate across the whole milking area which exceeds the capacity of the herd to harvest it. When this is the case, topping before grazing would not fix the problem, as it would be needed every grazing and the surplus would get bigger each time. In such situations some paddocks will need to be dropped out of rotation for conservation.

Topping is typically needed when:

- An allocation inaccuracy in a particular paddock during the previous grazing led to a higher than desired post-grazing residual, and higher proportion of clumps and elongated stems with low digestibility, that cows cannot eat without compromising DMI and, in turn, milk production.
- A rapid and unexpected increase in pasture growth occurs, where the higher growth rates are expected to continue. Even when the adequate proportion for the area has been closed for conservation, it is possible that some paddocks can have accumulated biomass above the target for pre-grazing cover.
- A short 'spike' of increased growth that led to high pre-grazing covers (for example during a week of unusually warm temperature and high radiation) which was followed by normal conditions. In this situation topping of paddocks with high pre-grazing cover is recommended because if the rotation length is reduced (sped up) in response to a temporary increase in growth rates, then paddocks will end up being grazing at an earlier leaf stage than desired.

Topping should be done 6 to 12 hours before the start of grazing—or less to minimise loss of nutritive value (mainly respiration of soluble sugars). This means topping the paddocks no earlier than in the morning for night grazings or the afternoon of the day before for morning grazings.

From three years of observations at the 3030 Project farmlet studies, the recommendation was that it is not worth topping when pasture mass is lower than 3,200 kg DM/ha (see Figure 3).

If rain is forecast for the next day, do not top the pasture because there is a high risk of increased wastage of pasture.

Figure 3. Pre-grazed topped pasture at the 3030 Project farmlets at Terang.

The effects of pre-grazing topping

- Reduces cows' selection, since leafy material is mixed with 'stemmy' material and picked up by the cows within the same bite. This leads to less wastage of pasture that would have been otherwise rejected by the cows.
- Allows grazing to the target residual more consistently. Cows will graze to the topped level for at least the next 3–4 rotations if the allocation is right.
- Encourages tillering across the paddock by having a consistent residual with no clumps (i.e. more sunlight reaching the base of the ryegrass plants and encouraging the initiation of new tillers).
- Reduces the 'bite fracture force' (the force necessary to remove a bite of pasture). In a study at Terang, Tharmaraj et al. (2003) found that this force was higher in tall pastures and increased in the lower heights of the pasture sward. The theory is that by not requiring the cows to physically break off the grass, a higher DMI can be maintained, compared to not topping, where a high proportion of material would be rejected. This could compensate for any drop in energy intake due to forcing the cows to eat a slightly lower nutritive mix of pasture because selection has been removed.
- Reduces milk yield in late spring but increases milk yield in summer: both a 2-week study in Tasmania (Irvine et al., 2010) and a 6-month study in New Zealand (Kolver et al., 1999) evaluating the effect of pre-grazing topping on cow performance found a reduction in DM intake of 2 kg/cow/day when topping in the late spring months (and summer in the NZ study). This led to decreased milk yields compared to the paddocks where no topping was performed.

  In the New Zealand study by Kolver et al. (1999) there was a significant increase in milk yield during summer when paddocks had been topped before grazing. This was due to the higher nutritive value and proportion of green active leaf of the regrowth (similar to what is observed after cutting pasture for early silage). In the study the increase in summer production compensated for the reduction of milk yield observed during spring.
- Increases the DM% of the consumed herbage due to wilting. However, in the studies by Irvine et al. (2010) and Kolver (1999) this increase in DM% did not result in statistically significant increases in total intake.
- It is not clear how much pasture is wasted by the failure of cows to collect all the material topped. In the Tasmanian study (Irvine et al., 2010), 754 kg DM/ha were measured as being left behind by the cows. However, in this short study, rejection seemed to be caused by the presence of soil and rainfall on the mowed material, with cows preferring the non-mowed material. Several farmers' experience in using pre-grazing topping suggests that the amount of topped material rejected by cows is low.

4. Summer post-grazing residuals

The key points for managing grazing residuals over summer, which were applied at the 3030 Project farmlets at Terang, are:

- Do not over-graze, maintain the residuals at 1,500 kg DM/ha. Cows tend to graze down to 1,200–1,300 kg DM/ha over summer, so grazing needs to be restricted.
- Aim to maintain some green material over summer (e.g. green stem, pseudostems), as this will help summer survival and autumn regrowth to build the feed wedge.

The presence of some pasture cover by maintaining residuals at ~1,500 kg DM/ha creates a more favourable micro climate near the soil surface than when grazed down to ~1,200 kg DM/ha. The micro climate can help retain soil moisture close to the surface and create protection from extreme soil surface temperature.

To achieve these aims is a significant challenge on dryland dairy farms with high stocking rates when the summer rainfall and temperature is not sufficient to support pasture growth. It is necessary to have a set strategy or plan to avoid over-grazing.

The approach to manage summer residuals is, in essence, similar to that adopted to avoid pugging under waterlogging conditions in winter. The strategy is to keep the cows in a reduced area (sacrifice paddock) where they can be fed out and only access the pasture paddocks to consume the allocated pasture, allowing for a residual of ~1,500 kg DM/ha.

First, identify paddocks suitable for use as sacrifice paddocks. These should have:

- Good stock water access
- Good shade
- Close proximity to the dairy
- Been previously identified for renovation.

By feeding out in the sacrifice area (see Figure 4), the cows will be less hungry when entering a new strip of grass, making it easier to control the grazing intensity and leaving a residual close to the target. A good estimation of pasture pre-grazing cover and knowledge of the paddock dimensions is also essential in order to allocate pasture more accurately and achieve the target residuals.

This management increases the persistency of a perennial ryegrass sward (see the 'Grazing management to maximize growth and nutritive value' Information Sheet for details), which will be in a much better position to recover from the dry period once the first significant rainfall event occurs.

Figure 4. Cows fed on a sacrifice area in early autumn at the 3030 Project farmlets at Terang.

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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

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