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Dry-off abruptly taking steps to reduce yield

The method used to dry-off cows can influence new infection rate during the dry period. The aim is to shut down milk secretion and seal the teat canal as rapidly as possible – this usually takes about two weeks. Most new infections occur in quarters where the teat canal has not sealed.

16.1 Dry-off cows before their production reaches 5 L or less per day

Cows with intramammary infections (IMI's) will have higher ICCCs (individual cow cell counts) as their production drops compared to uninfected herd mates. As production drops to very low levels, less than 5 litres, even uninfected cows will have a rise in ICCC. In seasonal calving herds, where there is no dilution effect provided by more recently calved cows the effects of this phenomena may result in significant increases in BMCC (bulk milk cell count). Additionally, the quality of milk from low-producing cows at the end of the season can cause processing problems for some dairy products due to changes in milk composition (such as the presence of plasma proteins and enzymes) and increases in cell counts. There is also anecdotal evidence that the occurrence of antibiotic residues at the subsequent lactation is more likely when antibiotic dry cow treatment is administered to animals at <5 L/day production. To avoid adverse effects on milk quality, it is recommended that cows be dried-off before milk yields fall to 5 L/day (Lacy-Hulbert et al 1995). This practice may also reduce the likelihood of mastitis infections at the following calving (Natzke et al 1975).

16.2 If cows are producing less than 5L/day consult your vet or milk company field officer before drying off to discuss the effectiveness of treatment and potential for residues after calving.

Management options to consider include;

- 1) not using a dry antibiotic or an internal teat sealant at dry off
- 2) using a dry cow antibiotic and making provisions to test the milk for antibiotic residues prior to sale when the cow calves. Farmers and advisers should be aware that there may be reduced efficacy of the dry cow antibiotic used in these cows.
- 3) using an internal teat sealant only

Occurrence of cows producing less than 5L per day at dry off should prompt a review of the process for earlier identification and dry off..

16.3 Take steps for cows producing more than 12 L/day, to reduce production to 12 L or less by the drying-off date. These steps involve reducing food intake and changing routine.

Rajala-Schultz et al (2005) showed that the higher the milk production at dry-off, the higher the risk for both cow and quarter being infected with

Confidence – High

The consequences of milking cows with low milk yield on milk quality and udder health are well documented.

Research priority – Low

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Planning for the drying off process should include strategies to reduce cow milk yield by the dry off date.

Reduction of feed intake should be done gradually and with an understanding that large energy deficits may precipitate metabolic disease and weight loss

environmental pathogens at the subsequent calving, even in the presence of antibiotic dry cow treatment. For every 5 kg above 12.5kg, the odds of infection doubled. Gott et al (2016a) also found that cows with higher yields at dry off had significantly higher ICCC in the following lactation.

This effect is likely due to failure of the teat canal to close after drying off: Dingwell et al (2004) found that closure was slower with higher milk production on the day prior to drying off: 68% of quarters were open 1 week after dry off in cows that had been producing >21kg compared with 44% open in cows producing <21kg. Gott et al (2016b) found that for every 4.5kg greater than 18.1kg the odds of a quarter leaking, doubled. In this same study, heifers' quarters leaking milk after drying off had 28 times the odds of having a new IMI at the subsequent calving.

Dairy advisers need to emphasise the importance of planning for drying-off so that, as well as organizing the clean paddocks for the cows to go to immediately after drying-off, farmers can implement management changes for high producing cows with at least one week's lead-time before the drying-off date. These management changes involve reduced feed intake and/or reduced milking frequency.

Reducing feed intake

The Countdown recommendations to reduce the concentrate intake of high-producing cows and to change their environment (such as grazing cows in unfamiliar paddocks or altering their routine) to assist the drying-off process are consistent with those of the National Mastitis Council in the United States.

Involution of udder tissue is accelerated if the plane of nutrition is reduced prior to drying-off. This can reduce milk yields by up to 30% and is a more effective strategy for reducing milk yields of high producing cows than once daily milking (Lacy-Hulbert et al 1999). This requires a balance in the ration to achieve the reduction in milk yield while maintaining sufficient energy for a cow that is 7–8 months pregnant.

Understanding current cow dry matter intakes and estimated energy of different components of the diet is important prior to reducing feed for cows close to dry off. In higher producing cows (greater than 20 litres per day), feed reduction should commence 3 weeks before the planned dry off date. If individual feeding or a practical way to reduce feed is available, higher producing cows should be separated from the main milking herd at least 2 weeks before dry off and fed reducing amounts of concentrate.

In higher producing cows, if a gradual reduction in feeding is not able to be achieved and there is a sudden removal of high energy feeds, cows will be at a higher risk of metabolic disease (e.g. pregnancy toxemia) or possibly even abortion.

Understanding current and planned diets to reduce milk production is best planned with a nutritionist but some basic calculations on energy requirements can be done, using Table 1 as a guide.

Table 1 Energy requirements of a 550-kg cow

	MJ/day*
Maintenance	55
7–8 months pregnant	70
A week before calving	80

*Where good quality hay is about 8.5 MJ/kg, pasture or grain is about 12 MJ/kg dry matter.

The practice of restricting water intake is not recommended. Access to water at all times is a requirement of all animal welfare codes. Furthermore, veterinarians in some districts have reported outbreaks of salmonellosis associated with restricted water intake.

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16.4 Dry off abruptly; do not skip days and if possible, do not skip milkings.

Milk out as usual at each milking until drying-off. Do not deliberately leave some milk in the udder (under milk). It is not necessary to leave milk in the udder at the last milking to improve the action of Dry Cow Treatment.

Reducing frequency of milking

Historically, reducing the frequency of milking is thought to increase the risk of mastitis. While the risk of mastitis is greatly increased if cows are milked every second day (Zecconi et al 1995, Lacy-Hulbert et al 1999), once a day milking may be of benefit in some situations, especially in animals producing more than 18–24 L of milk per day.

For Zobel et al (2013), once daily milking of high-producing cows (24 L per day) reduced milk production and the final milking volume compared to twice daily milking (10.9L vs 14.1L). After drying off, these cows spent less time anticipating milking and milk leakage was significantly reduced (75% vs 27% of cows). No effect on other indicators of udder discomfort were seen. It is important to note that the cows in this study were administered antibiotic dry cow, and both internal and external teat sealants. Once daily milking did see an increase in ICCC over the 5 days of reduced milking frequency, but these returned to pre-experiment levels within 7–10 days post calving. Advisers need to be aware that in some seasonally calving herds, the temporary change to once daily milking may increase BMCC. For herds with high BMCCs at the start of the process of drying off a larger number of cows, this increase due to once daily milking may result in a BMCC above their factory's premium quality cut off.

Conversely, once daily milking (Gott et al 2016) was not significantly associated with lower milk yield or higher ICCC in early lactation compared with abrupt dry off. In this study, higher yields at dry off had significantly higher ICCC in the following lactation.

In summary, restricting feed intake reduces milk yield to a greater degree than once daily milking, however reducing milking frequency may be needed to reduce yields further.

Once per day milking is a strategy that will reduce milk yield with minimal risk to udder health. 'Skip a day milking' is not recommended.

Confidence – High

Milking must occur every day prior to drying-off to minimize risk of infection.

Research priority – Moderate

Further investigation of the effects of once-a-day milking on milk yields and subsequent milk leakage could be investigated in the pasture-based setting.

16.5 Don't leave cows in laneways or yards immediately after drying-off

16.6 Put the cows in a dry, clean paddock (not heavily soiled with manure, no bare ground, no exposure to dairy effluent) for 3–4 days after drying-off.

It is important to minimise the number of bacteria on teats by teat dipping or spraying after the last milking and not allowing cows to lie down on bare ground or areas that are soiled with manure in the two hours immediately after drying off.

Cows should be put in dry, clean paddocks (not heavily soiled with manure, little bare ground, no exposure to dairy effluent) for 7–14 days after drying off. This is because the numbers of coliform and streptococci bacteria in the environment are important predictors of new infection rates.

Pseudomonas mastitis infections are usually associated with contaminated water supplies and outbreaks have been recorded in situations where cows lie in wet conditions in the first few days immediately after drying-off. These infections may be very severe (often fatal) and virtually impossible to treat.

Rapid formation and maintenance of a keratin plug will help prevent new infections (Capuco et al 1992, Williamson et al 1995, Dingwell et al 2004) as will the application of internal sealants at dry off (Rabiee and Lean 2013). Keeping cows in a clean paddock well away from the milking herd

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and milking area reduces the possibility of triggering milk ejection (as was demonstrated by Zobel et al (2013) and therefore assists plug formation and/or retention of internal teat sealant. An additional benefit of keeping cows out of the milking shed is that there is no chance that cups are mistakenly attached leading to antibiotic contamination of the bulk vat.

16.7 Continue the maintenance only diet for up to one week for cows that were producing 12 or more litres/day in the week before drying-off.

Restricting feeding after drying off helps accelerate the udder involution process. Most cows in modest body condition are only likely to require maintenance diet for up to 7 days before gross involution of the udder occurs, and feed intakes can be increased.

The addition of an internal teat sealant at dry off does not guarantee that cows will not leak milk. Leaking milk after dry off is affected by the pressure inside the udder and the method of administration. We know that reduction in yield at dry off is associated with reduced risk of mastitis. It is reasonable to suspect that cows with reduced yield will leak less. Some field observations have noted that even when teats leak milk, there is still a protective effect that is associated with the use of teat sealants

Key papers

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Confidence – Low

There is no evidence to support or refute that internal teat sealants still provide protection in cases where leakage of milk occurs

Research priority – Moderate

Confidence – High

Rapid involution of the gland is assisted by a restriction in feed intake

Research priority – Moderate

The optimum feed restriction after drying off for cows that are fully protected with antibiotic dry cow therapy (DCT) and/or internal teat sealant (ITS) has not been confirmed in field studies.

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