

# Using once-a-day milking in early to mid-lactation

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*Once-a-day (OAD) milking is often used by dairy farmers as a short or medium-term management strategy at various stages of the milking season. Typically, part-season OAD milking is either a planned approach, or is used to alleviate a temporary crisis/difficult management situation (e.g. during a feed shortage). This article describes the impact of OAD milking in early to mid-lactation on factors influencing dairy farm productivity and profitability, including milk production and potential carry-over effects when twice-a-day (TAD) milking resumes.*

## What effect does OAD milking immediately post-calving have on milk production?

OAD milking in early lactation may have positive labour productivity benefits on individual farms because it is an especially busy and challenging time of year. However, OAD milking immediately post-calving results in approximately 20% less milksolids (MS) per day, compared with TAD milking. The loss in MS increases to 25 to 30% per day if the duration of OAD milking goes beyond the first two to three weeks of lactation. This effect is shown in Figure 1, where cows were milked either OAD or TAD for 10 weeks post-calving in a recent DairyNZ trial<sup>(1)</sup>.

OAD milking may also increase somatic cell counts, and while it has not been found to increase the risk of mastitis, farmers should still be vigilant with mastitis management, as OAD milking will magnify existing problems. It is also important to ensure heifers, in particular, are milked out to minimise the loss in production.

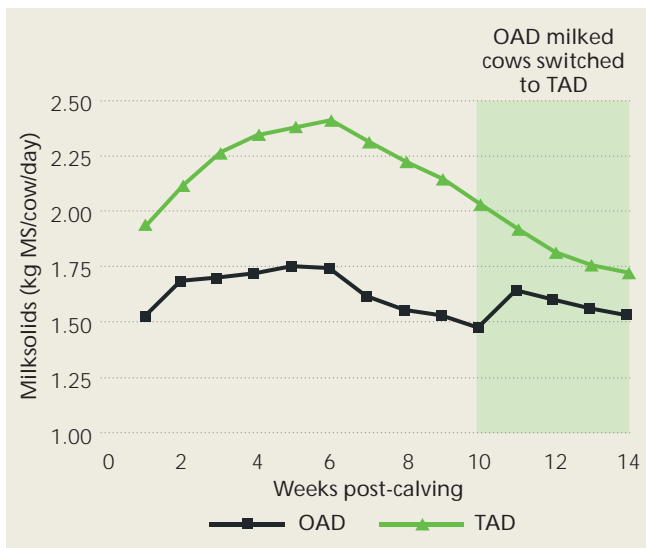
## How does nutrition affect milk production responses to OAD milking?

The impact of pasture restriction combined with OAD milking post-calving has not yet been examined under New Zealand conditions. However, overseas research indicates that the MS yield loss with OAD milking is additional to any effect of underfeeding<sup>(2)</sup>.

Therefore, a decrease in milk production due to underfeeding can not be alleviated by milking cows OAD. This is because milking frequency and nutrition affect milk production by different physiological mechanisms<sup>(2)</sup>. OAD milking decreases the udder's ability to extract nutrients from the blood for milk production, reduces the activity of cells that produce milk, and ultimately

## Summary

- OAD milking in early to mid-lactation can lead to improvements in labour productivity, animal energy status, and some reproductive variables. These positive benefits need to be compared with the negative effects of OAD milking on MS production when considering using this strategy in early lactation.
- OAD milking decreases immediate MS production by 20% post-calving and by 15 to 20% in mid-lactation, with the magnitude of the yield loss increasing with the duration of OAD milking.
- OAD milking in early to mid-lactation can have negative carry-over effects on later TAD production – the size of this carry-over effect increases the longer the cows are milked OAD.
- The effects of milking frequency and nutrition on MS yields are separate and additive. Therefore, improved nutrition can increase MS yields in cows milked OAD in early lactation.
- During a feed restriction, OAD milked cows will produce less MS than TAD milked cows, but may be in better energy status due to reduced energy requirements for milk production. Farmers facing a feed shortage are referred to the *DairyNZ Spring Survival Guide* for practical advice and tools to manage a pasture deficit, including the Spring Rotation Planner and the economics of feeding high quality supplements.



**Figure 1. Average milk solids production (kg MS/cow/day) of cows milked either once a day (OAD) or twice a day (TAD) for the first 10 weeks post-calving, after which time all cows were milked TAD.**

decreases the number of cells that produce milk by promoting cell death. In contrast, underfeeding reduces the supply of nutrients to the udder, and blood (and nutrients) are directed towards other tissues. It also reduces the proliferation of new mammary cells, resulting in a decline in the number of milk-secreting cells in response to prolonged low nutrition. In both of these situations, these physiological changes can lead to long-term effects on milk production.

These separate mechanisms also mean that increased nutrition can improve milk yields during OAD milking. A recent DairyNZ study<sup>(1)</sup> showed that offering concentrates increased MS yields by a similar amount (~26g MS/kg concentrate eaten) in both OAD and TAD milked cows post-calving – although supplemented OAD milked cows were still unable to produce comparable yields to TAD milked cows that received only pasture.

This trial also demonstrated negative carry-over effects of OAD milking on MS production (Figure 1), but this effect was reduced in cows that received supplements post-calving. Cows that were milked OAD and fed concentrates post-calving had a smaller MS production loss when switched to TAD milking and pasture alone, compared with cows that had previously received only pasture (i.e. 9 vs. 17% less MS per day than cows that had been milked TAD since calving).

### What are the long-term milk production effects of OAD milking immediately post-calving?

The negative carry-over effect of OAD milking on milk production increases the longer the cows are milked OAD<sup>(3)</sup>. This is most likely due to altered udder function, as discussed earlier. However, any potential milk income losses need be considered in relation to the possible beneficial effects of OAD milking on labour requirements, lifestyle and animal health.

Figure 2 predicts the curvilinear relationship between the duration of OAD milking post-calving and the annual MS yield loss (as a % of TAD milking) based on available data. Milking cows OAD for the first week post-calving is expected to immediately reduce MS yields by 20%, but with little MS losses for the remainder of lactation when cows are milked TAD. The estimated annual MS yield loss from such short-term OAD use is small (0 to <5% per cow).

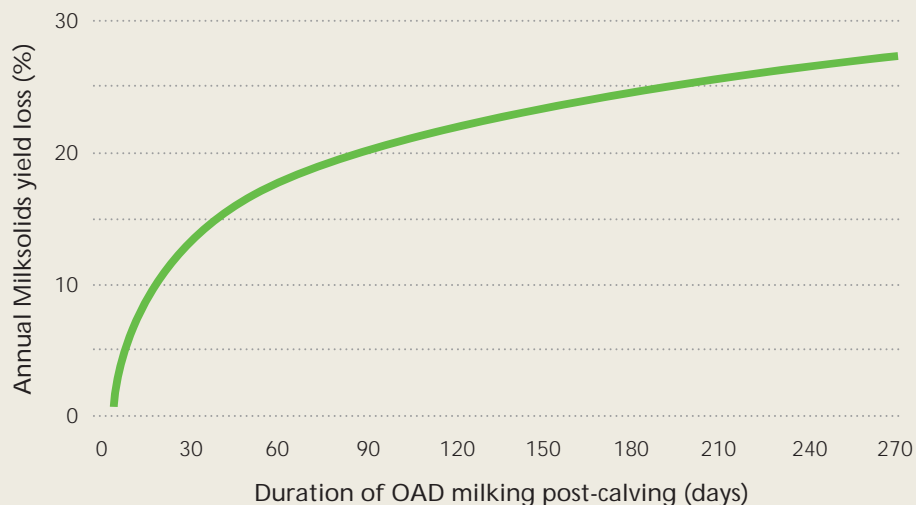
In comparison, milking cows OAD for longer than six weeks post-calving decreases MS yields by 25 to 30%, with additional reductions of 10 to 15% when cows are then milked TAD. Estimated annual MS yield losses from this system are approximately 15% per cow; this is compared to annual MS yield losses of 30% for Holstein-Friesians and 20% for Jerseys from whole season OAD milking<sup>(4)</sup>.

CONTINUED PAGE 12



Figure 2.

Predicted relationship between the duration of once-a-day (OAD) milking starting at calving and the annual milksolids yield loss (% of twice-a-day milking) in Holstein-Friesian cows, using data from New Zealand and overseas experiments.



### What is the effect of OAD milking in mid-lactation on milk production?

Ruakura trials<sup>(5,6)</sup> reported that two weeks of OAD milking starting at week 12 of lactation resulted in a daily milk yield loss of 14 to 18%, with no measurable carry-over effects. However, 12 weeks of OAD milking after peak lactation (weeks 7-18) reduced milk yields by 27% for Holstein-Friesians and 17%

for Jerseys. Carry-over milk yields were 21% and 16% below controls for Holstein-Friesians and Jerseys, respectively, after resuming TAD milking. This was associated with accelerated udder regression, particularly in Holstein-Friesian cows, indicating that they are less tolerant of long-term OAD milking. These breed effects have since been confirmed in whole season OAD milking trials in Taranaki<sup>(4)</sup>, but there is considerable variation between individual cows within both breeds.



## What is the effect of OAD milking in early lactation on feed intake and body condition?

Although they require less energy for milk production, cows milked OAD in early lactation typically have similar or only slightly reduced (~0.5 kg DM/cow/day) feed intakes when offered the same allowance as TAD milked cows. This means that cows milked OAD may have improved energy status<sup>(1,2,3)</sup>. However, there is usually little effect on body condition score loss until five to six weeks post-calving<sup>(1)</sup>. OAD milked cows then have greater gains in body condition as lactation progresses<sup>(1,3,4)</sup>. Feeding supplements will not reduce the rate of body condition score loss in the first six weeks post-calving in either OAD or TAD milked cows<sup>(1,7)</sup> as any additional feed replaces pasture (substitution rate) or is put into milk production.

## What is the effect of OAD milking in early lactation on reproduction?

There have been several studies where reproductive performance has improved with OAD milking. Cows milked OAD for ten weeks post-calving resumed oestrous activity seven days earlier and required fewer CIDRs than cows milked TAD, but feeding

concentrates for the first six weeks did not give any additional benefits<sup>(1,8)</sup>. In a four year trial<sup>(4,8)</sup>, cows milked OAD from calving had higher three week submission and pregnancy rates, conceived three days earlier and required fewer CIDRs than cows milked TAD. This occurred despite the OAD milked cows having reduced pasture allowances due to a 17% greater stocking rate.

Four weeks of OAD milking from seven days before until 21 days after the planned start of mating (PSM) in anoestrous cows from commercial herds increased the spontaneous resumption of oestrus (i.e. started animal cycling) compared with TAD milking, but did not improve the intervals from PSM to first insemination or conception<sup>(9)</sup>. The use of CIDRs resulted in a greater percentage of cows detected in oestrus and reduced the intervals from PSM to first insemination and conception, compared with short-term OAD milking around the PSM<sup>(9)</sup>.

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