

# Effect of Nutrition on Once-a-Day (OAD) Milking

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## Executive summary

1. Offering 4.5 kg DM of cereal pellet for the first 6 weeks of lactation to cows milked once a day (OAD) increased peak milksolids (MS) production by 0.2 kg MS/cow/day to 1.83 kg MS/cow/day.
2. A carryover effect from meal feeding lasted for at least 4 weeks and was higher for cows milked OAD than those milked twice a day (TAD).
3. Cows milked OAD in early lactation had 3 and 5% lower energy intakes than those milked TAD on pasture and pasture + meal, respectively.
4. Cows milked OAD lost 0.25 condition units less in early lactation than cows milked TAD.
5. Feeding pasture + grain from mid-January to mid-February to cows milked OAD from calving kept MS yield at 1.3 kg MS/cow/day, compared with 1.15 kg MS/cow/day for those on pasture.
6. Failure to feed high-quality pasture or supplement at transition from TAD to OAD milking in mid-summer can lead to large decreases in MS yield.

## Introduction

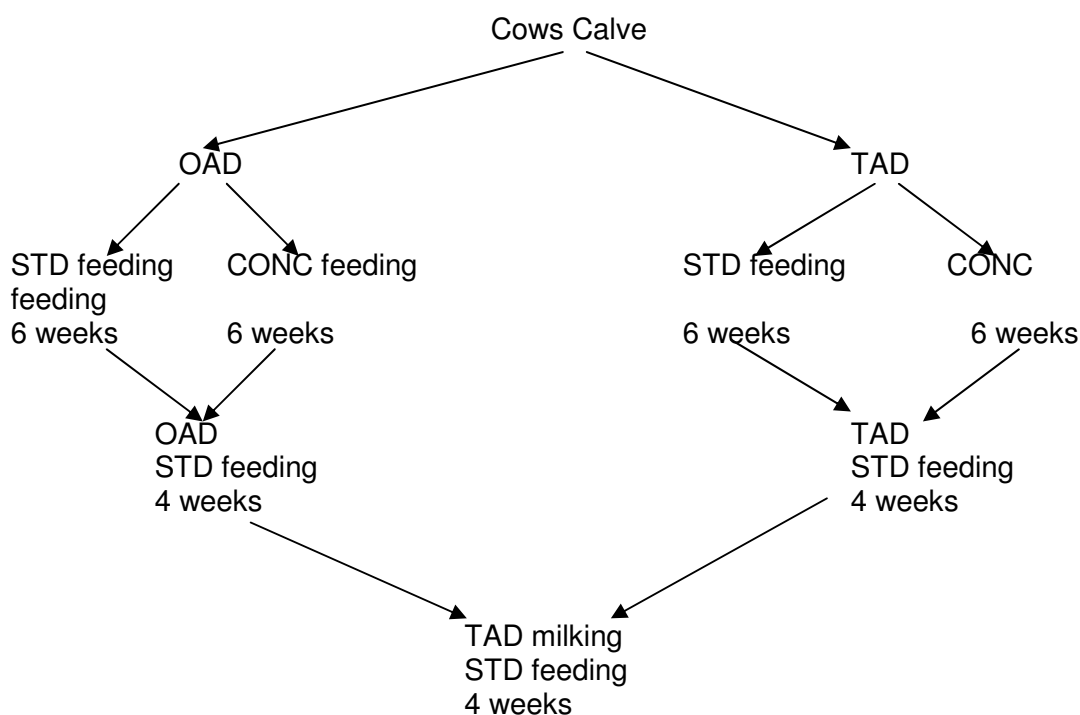
Cows milked OAD can be successfully managed with either 12 or 24 hour grazing. The key determinants of which to choose are paddock size and personal preferences. Some farmers don't want the hassle of moving cows in the afternoon so choose 24 hour grazing.

Of greater importance is the quality and quantity of feed on offer. Cows milked OAD can be more sensitive to feed deficits and declining pasture quality. They respond by reducing milk production. This has also been observed in herds on irrigated farms when feed supply has declined in mid- to late-lactation. When additional feed is available or pasture quality improves, cows with a lower Breeding Worth (BW) are less likely to increase MS production, instead they use the additional feed for body condition gain.

## Spring Experiment

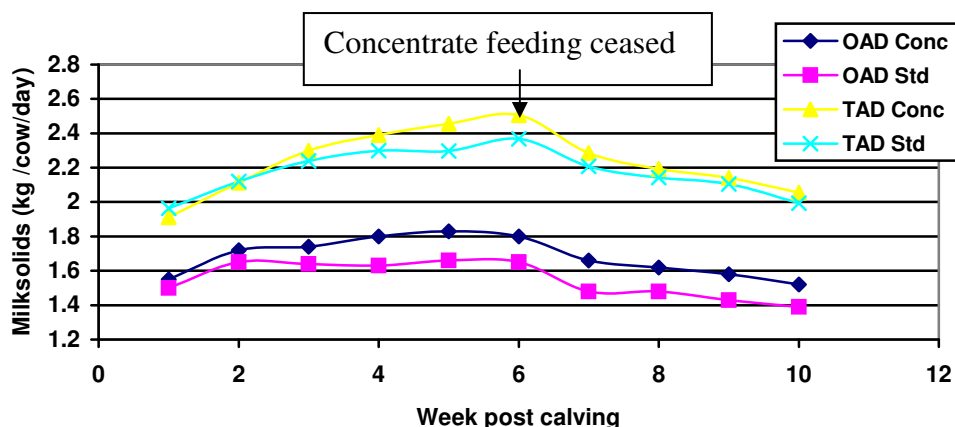
In spring 2006 we embarked on a research programme in Taranaki to investigate the effect of diet quality and metabolisable energy (ME) intake on milk production at several stages during lactation. By the end of the 2006-07 season we will have undertaken feeding challenges in early-, mid- and late-lactation. Only the early lactation results and preliminary mid-lactation milk production results are presented in this paper. The objective of the spring trial was to compare the milk production, energy balance and reproductive performance of cows milked either OAD or TAD, and offered either the standard post-calving diet of pasture plus forage supplement (Std.), or this diet supplemented with 4.5 kg DM of a high quality grain pellet (Conc.) for the first 6 weeks post-calving. In addition, with the OAD milking treatment we were interested in any carryover effects of improved nutrition on subsequent OAD

and TAD milk production (Figure 1). Cows calved between 26<sup>th</sup> July and the 24<sup>th</sup> August.



**Figure 1.** Schematic diagram of the nutritional challenge trial at WTARS during spring 2006. Cows were milked once a day (OAD) or twice a day (TAD), and offered either the standard post-calving diet of pasture plus forage supplement (Std.), or this diet supplemented with 4.5 kg DM of a high quality grain pellet (Conc.) for the first 6 weeks post-calving. OAD and TAD milking cows then returned to the Std. diet for 4 weeks, and then all cows were placed on TAD milking.

Offering 4.5 kg DM of 12.5 MJME/kg DM cereal pellet for the first 6 weeks of lactation to cows milked OAD increased peak MS production by 0.2 kg MS/cow/day to 1.83 kg MS/cow/day (Figure 2). This compares to a peak MS production of 2.5 and 2.37 kg MS/cow/day for the TAD Conc. and TAD Std. treatments, respectively (Figure 2). The difference in MS production between the OAD Std. and OAD Conc. treatments continued to week 10 post-calving, after which all cows were returned to TAD milking. The carryover response to concentrate was higher for the cows milked OAD than those milked TAD. At a \$4.00/kg MS payout the immediate response to the concentrate was 80c more per cow per day. The DM and ME intakes of the treatment groups are presented in Table 1.



**Figure 2.** Average milksolids production (kg MS/cow/day) for the first 10 weeks of lactation in cows milked either once a day (OAD) or twice a day (TAD) with (Conc.) or without (Std.) 4.5 kg DM concentrate supplementation.

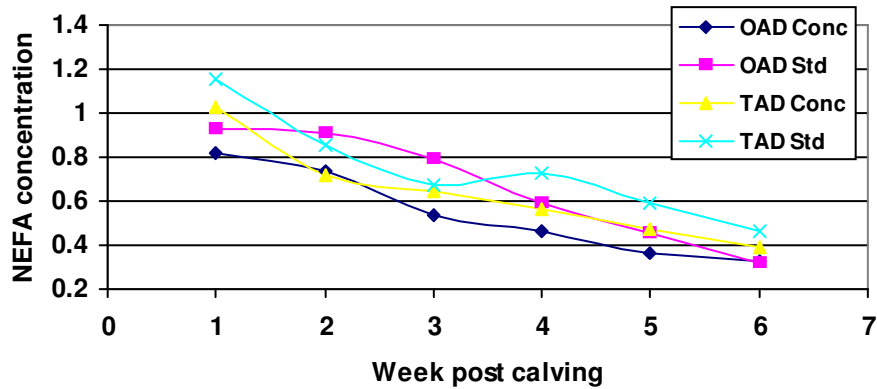
**Table 1.** Average pasture, forage supplement and concentrate dry matter intake (DMI, kg/cow/day; and ME intake, MJME/cow/day) during the first six weeks of lactation in cows milked either once a day (OAD) or twice a day (TAD) with (Conc.) or without (Std.) 4.5 kg DM concentrate supplementation.

	OAD Std.	OAD Conc.	TAD Std.	TAD Conc.
Pasture DMI	10.4	9.4	11.0	9.9
Forage DMI	2.1	2.1	2.1	2.2
Concentrate DMI	0	3.5	0	3.5
Total DMI	12.5	15.0	13.1	15.6
MEI	147	179	154	184

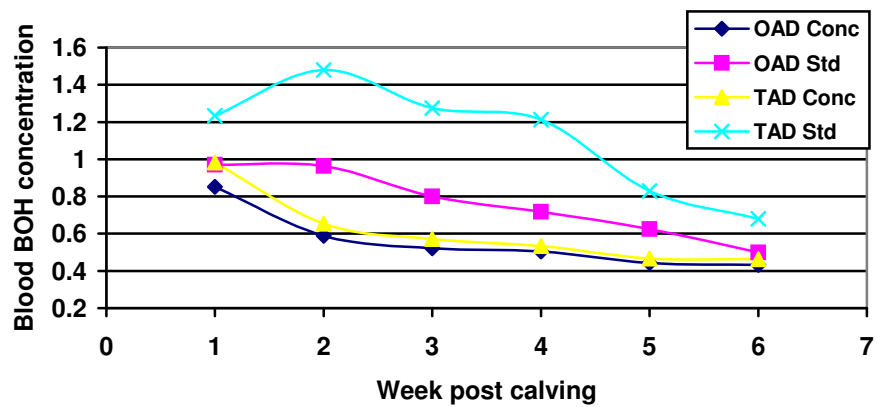
Blood non-esterified fatty acid (NEFA) concentrations decreased for all treatments from calving to 6 weeks post-calving (Figure 3) and correspondingly, blood glucose concentrations increased (data not presented). In general, cows milked OAD had lower NEFA concentrations than those milked TAD, and cows offered concentrate had lower NEFA concentrations than those on the standard diet. Blood NEFA concentrations are an indication of the amount of body tissue mobilisation that is occurring. These results suggest that cows milked TAD were mobilising more body condition than those milked OAD, and that offering concentrate also reduced body tissue mobilisation. Blood beta-hydroxybutyrate (BOH) concentrations (an indication of ketosis) were highest in the TAD Std. group and lowest in the TAD and OAD Conc. groups (Figure 4). The blood results are supported by condition score data collected weekly throughout the experiment (Figure 5). The OAD milking cows lost less condition (0.25 of a condition score) than the TAD milking cows in early lactation. At their lowest point the TAD milking cows averaged 4.25 condition score compared with 4.5 for the OAD milking cows. Milking frequency or nutrition had no effect on the number of weeks over which the cows lost weight, with all cows reaching their lowest body condition 7-8 weeks post-calving. Interestingly, offering a high-energy concentrate for the first 6 weeks did not affect the rate of condition score loss for either milking frequency.

The results of the spring trial indicate that increasing the ME intake of cows milked OAD in the first 6 weeks will increase MS production at peak, and this benefit is still present at week 10 of lactation. While this experiment achieved a higher ME intake

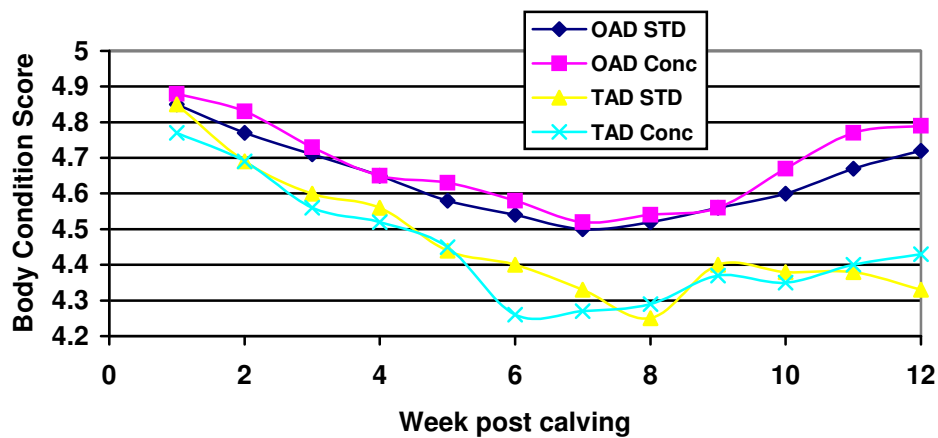
using cereal grain it is likely that a similar outcome could be achieved by offering a higher allowance of good quality spring pasture.



**Figure 3.** Blood non-esterified fatty acid (NEFA) concentrations during the first 6 weeks of lactation for cows milked either once a day (OAD) or twice a day (TAD) with (Conc.) or without (Std.) 4.5 kg DM concentrate supplementation.



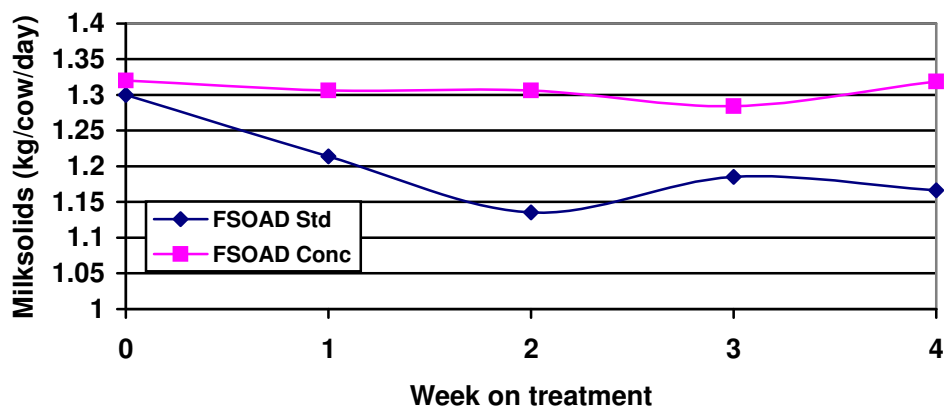
**Figure 4.** Blood beta-hydroxybutyrate (BOH) concentrations during the first 6 weeks of lactation for cows milked either once a day (OAD) or twice a day (TAD) with (Conc.) or without (Std.) 4.5 kg DM concentrate supplementation.



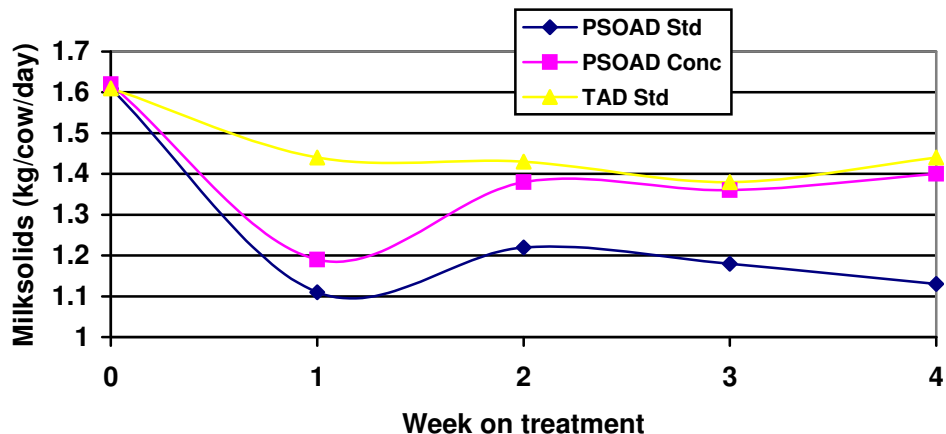
**Figure 5.** Body condition score during the first 12 weeks of lactation for cows milked either once a day (OAD) or twice a day (TAD) with (Conc.) or without (Std.) 4.5 kg DM concentrate supplementation.

## Summer Experiment

In summer 2007 we undertook an experiment at WTARS to compare 2 different feeding regimes during mid-lactation in mature dairy cows milked either TAD, OAD all season (full-season OAD; FSOAD) or OAD from mid-January (part-season OAD; PSOAD). In addition to the standard pasture and forage supplement diet (Std.), cows in the concentrate (Conc.) groups were offered 4.5 kg DM of a 12.5 MJ ME/kg DM grain pellet. Concentrate feeding began 5 days prior to the commencement of the trial. The PSOAD herd were switched to OAD milking on day 1 of the trial. Feeding grain from mid-January to mid-February to cows milked OAD from calving maintained MS production at a higher level than similar OAD milking cows offered a standard pasture/forage diet (Figure 6).



**Figure 6.** Daily milk solids production in mid-lactation of cows milked once a day (OAD since calving (full-season OAD; FSOAD) and offered a pasture/forage diet with (Conc.) or without (Std.) 4.5 kg DM concentrate supplementation.

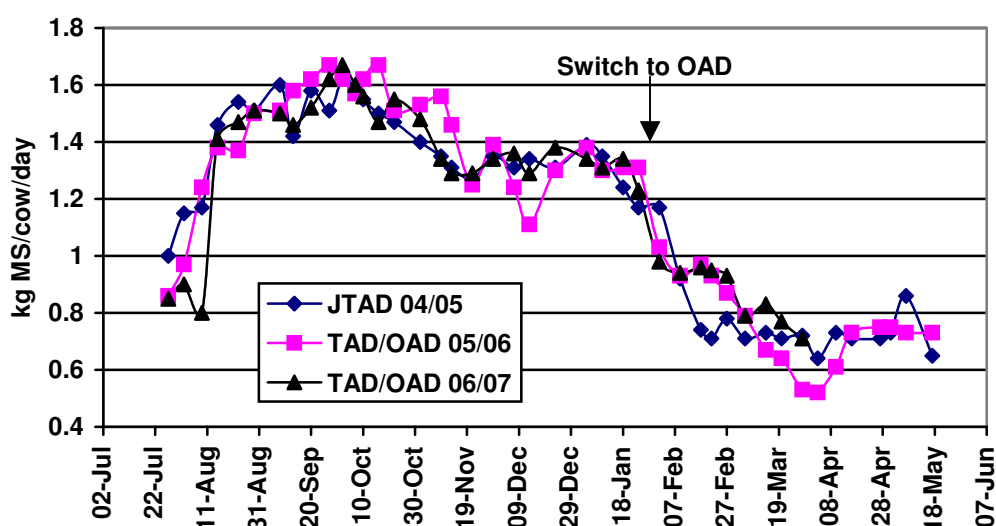


**Figure 7.** Daily milk solids production in mid-lactation of cows milked twice a day (TAD) or once a day (OAD) from mid-January (part-season OAD; PSOAD), and offered a pasture/forage diet with (Conc.) or without (Std.) 4.5 kg DM concentrate supplementation.

In the TAD milking – PSOAD milking comparison, all groups dropped in yield in the first week of the experiment. However, by week 2 of the trial MS production of the PSOAD Conc. cows had increased to a level similar to the TAD milking control herd (Figure 7). Production of the PSOAD Std. herd was similar to that of the FSOAD Std. herd viz. approximately 1.15 kg MS/cow/day (Figures 6 and 7).

## Waimate West Demonstration Farm (WWDF) OAD Milking Trial

At the WWDF in the 2004-05 season the switch to OAD milking at the end of January coincided with a period of hot dry weather and a decline in feed quality and quantity. In hindsight the decision to feed silage was made a week too late and consequently production declined rapidly from 1.2 kg MS/cow/day to 0.75 kg MS/cow/day in two weeks (Figure 8). In the 2005-06 season silage feeding was commenced 10 days prior to the switch to OAD milking and was continued throughout the summer. This resulted in a much smaller (0.25 kg MS/cow/day) decline in yield. This season a similar decline was observed but production has stayed higher through to late March due to a wetter summer and better quality feed available (Figure 8). One encouraging result at the end of the 2005-06 season was the increase in production observed once good quality autumn pasture was available in mid-April.



**Figure 8.** Milksolids production (kg MS/cow/day) in Jersey cows for the part-season once-a-day (OAD) milking herd (TAD/OAD) at WWDF during the 2005-06 and 2006-07 seasons, compared with TAD milking production in the previous 2004-05 season.

## Conclusions

Nutritional management of cows during the transition period from TAD to OAD milking is critical. Don't leave it until you are short of feed to make the change, as this is likely to result in a large decrease in production (up to 0.5 kg MS/cow/day). Excellent pasture management, to ensure sufficient high quality pasture is available at all times, is critical to the success of the OAD milking system. Any mistakes with feeding will quickly be seen in the vat and are often difficult to correct.