Once a Day (OAD) Milking

1. Introduction

Efficient milk harvesting requires the cows, people and facilities to be interacting smoothly at every milking. Once a Day (OAD) milking reduces the time spent each day milking cows. To benefit the farming enterprise, adoption of OAD milking requires changing more than just the number of milkings performed daily. This Quick Note gives a brief introduction to the topic, examines some key issues and suggests sources of further information.

2. Interpretation and relevance to Australian conditions

The milking frequency of dairy herds is determined by cultural, production and economic factors. We widely accept twice a day (TAD) milking, with an interval between milkings of 8-14 hours, as being the norm. OAD has been investigated and implemented in modern dairy systems in New Zealand, Ireland and France. It has been viewed as a potential means of delivering improved social conditions for the people milking the cows, improving the health and welfare of cows, tailoring production to meet EU quota and reducing the production costs of the farm.

The milk harvesting process utilises a significant portion of the farm labour and capital. Mechanisms that enable the farm to reduce the cost of milk harvesting could potentially increase farm profitability. To realise such benefits, the savings made in reducing milking costs must not be offset by greater reductions in milk income, increases in other farm costs, nor should it challenge milk quality.

3. Features of Once A Day Milking

Production

Research has demonstrated a decline in milk production ranging from 10 to 43% for cows milked OAD compared to cows milked TAD. Variations in the response to changing to OAD milking were largely due to the production at commencement, the stage of lactation, no. of calves (parity), breed and other factors such as feeding strategy. The largest changes in production were reported when cows were introduced to OAD in early lactation. Research in France shows production loss of between 30 and 43% in high producing cows and heifers respectively (averaging around 30kg/day over a lactation). New Zealand trials comparing OAD and TAD have mainly been performed in mid to late lactation (cows producing less than 20kg/day) with 10 to 38% declines in production reported.

The production of individual cows before OAD milking is initiated does not totally reflect the change in production seen. Milk yield is related to development of secretory tissues (alveoli) in early lactation and the nutritional status of the cow. In addition, the rate of milk secretion in the udder is controlled by the presence of a specific milk protein - as the level increases in the alveoli, milk secretion slows. When milking occurs the protein is drained from the alveoli and milk secretion increases again. The volume of the udder cistern is also associated with the milk secretion rate. It follows that heifers having smaller milk cisterns and less developed udders are particularly affected. The milk production of cows with large udder cisterns are less affected by infrequent milking.

Breed differences occur. The yield of breeds with higher test and milk storage ability (hours worth of secretion) tend to be less affected. Very few Friesians are as suitable as the average Jersey to OAD milking. Within breed variability in the decrease in milk yield (kg/day, %) is high, suggesting that cows can be selected to suit OAD milking systems. A OAD selection index is now available to New Zealand's dairy farmers through LIC.

New Zealand herds that have adopted OAD milking have increased stocking rate to overcome the decline in individual cow production. Researchers in NZ used an increase in stocking rate of 17%, from 3 cows per ha to over 3.5 cows per ha in their research, but the optimal level will depend on the herd.

Dry matter intake of the cows would be expected to decline with lower milk production. The New Zealand information indicates dry matter intakes do decline in relation to the decrease in milk production. Some European trials have not demonstrated a significant change in dry matter intakes. All studies have described the OAD cows having higher body condition scores than cows milked TAD. This observation reflects the changed energy demands and utilisation of the cows being observed and matches the observation of declining body condition when milking frequency increases.

Milk Quality

Universally, as milk volume declines the concentration of somatic cells will increase. This has been witnessed in herds adopting OAD milking. The magnitude of change in somatic cell counts is greater in quarters and cows with existing intramammary infections. There is no evidence that the number of infected cows or quarters increases as a consequence of OAD milking. Milking OAD does not appear to change the incidence of clinical mastitis.

The magnitude of change in the BMCC is dependent on the change in milk production and the number of infected cows in the herd. The New Zealand trial herds experienced a change in BMCC from 160,000-180,000 to 248,000 – 298,000. In all of the reviewed trials, cows were preferentially culled or dried off in mid to late lactation to maintain BMCC within the quality bands. As the premium band for most Australian dairy companies is below 250,000 cells per ml, significant efforts will be required to maintain milk within the premium quality payment bands. Particular focus needs to be applied to managing chronically infected cows and minimising the impact of new infections at calving.

The milk secreted from cows milked once daily has a different composition than cow milked TAD. The fat and protein levels are higher. The protein fractions in milk from OAD milking have increased levels of serum proteins (whey). In addition, the enzyme activity in the milk is increased contributing to poorer processing characteristics of the milk and shorter shelf life of products. Manufacturing tests in France found little difference between yield and other quality characteristics of cheese made from OAD and TAD milk.

Milking Times

Milking once daily reduces the time spent milking in a day. The time spent milking the herd for one milking is greater than either the morning or the evening milkings. The table below illustrates the likely changing in milking performance expected from a regime of OAD milking – it is not intended to be a full financial analysis. About 3 hours are saved daily, which can be applied to other activities.

	TAD	**OAD**	**OAD with increased herd numbers**
Herd Size	200	200	234
Annual per cow production (litres)	5400	3780	3780
Annual fat (kg)	240	168	168
Annual protein (kg)	220	154	154
Days of lactation	290	265	265
Peak milk production (litres)	30	21	21
Avg BMCC	180,000	260,000	260,000
Milk value (c/litre)	28	27	27
Gross milk income	$302400	$203212	$237759
Milk harvesting costs cents per litre. Does not include capital cost of dairy	2.8	2.3	2.1
Milking time per milking	3 hours 9 mins	3 hours 27 mins	3 hours 39 mins
Milking time per day	6 hours 18 mins	3 hours 27 mins	3 hours 39 mins
Litres Per Operator per hour (TMHT)	652	1333	1346
Annual Milk Harvesting Cost ($)	$29,816	$18,670	$18,574

The figures in the table have been generated from the CowTime CowCoster modelling program using figures extrapolated from the New Zealand data on OAD milking. The example dairy was a 20 unit swing over dairy with one person milking. From the above figures there is $12,000 dollar per year **saving in milk harvesting costs**, or a saving of 0.5-0.8 cents per litre in milk harvesting costs. Gross milk income was **reduced** by $64,000-$100,000. This analysis does not include the impact on feed, herd and finance / capital costs.

Health and Welfare

Despite health and welfare being listed as an area of potential improvements for adopting OAD, there is insufficient objective data to make any conclusions or recommendations. Cows milked OAD were reported to have higher body condition than TAD cows in all studies. No difference was reported in the level of mastitis. Reproductive performance would be expected improve if low body condition at calving or negative energy balance in early lactation were limiting herd performance. Suggestions have been made that lameness is reduced from reduced distance walked and time in yards. This has not been corroborated.

Behavioural research from Europe has found that cows quickly adapt to OAD milking when on grass. Cow may experience an increase in milk leakage from the udder prior to milking for 1 – 2 milkings after OAD milking commences. No signs of discomfort or signs of an extra 'desire to be milked' have been reported by OAD farmers.

4. Expected benefits of implementing OAD milking

- Saving time in milk harvesting (hours per day), reduced milking time for the day
- Reduced labour input for milking - more time available for other activities (on and off farm)
- Reduced cost of harvesting milk in terms of cents per litre and total dollars spent annually
- Reduced time spent moving and yarding cows (able to graze further from the dairy, large herds)
- Increased amount of manure and urine delivered onto paddocks rather than tracks and yards
- Can reduce workload (and milk production) in times when it is not profitable to feed cows
- May postpone the need for new capital investment in the dairy as cow numbers increase by dividing the herd in two and milking each herd OAD for a period
- Can be applied to all or part of herd
- Can be used for all or part of lactation (especially in late lactation)
- Can be used for all or part of the week (To date research has not specifically targeted milking OAD on weekends only)
- If adopted, research shows that herds producing less than 20 litres daily can revert to TAD milking within 2 weeks without significant impact on production. In higher producing cows, French researchers have shown increasing production loss as the time on OAD miking increased (10% at 7 weeks), and also as the time of application moves closer to calving (0.3 L daily at 30 weeks post-calving, compared to 1.8 L at 9 weeks)
- Production in subsequent lactation(s) is not reduced if cows resume being milked TAD

5. Potential challenges with implementation

- Reduced milk production from cows and herd
- Reduced milk income from reduced production and possibly changes in milk quality
- Meeting somatic cell count targets in later lactation
- Increased milking time for each milking
- Need to purchase additional cattle if stocking rate is increased
- Need to change type of cows in herd to suit OAD milking
- Shorter lactation length and increased number of days carrying dry cows
- Increased culling rates of cows not suited to OAD milking system
- Farms willingness to accept lower herd and per cow production
- Additional cost of herd recording and other herd costs
- Additional capital costs (holding yard capacity etc) in managing larger herds

6. Robustness of this information

This information is based on credible international studies. There are some gaps in the knowledge pertaining to specific local conditions and management. Further work is required on the methods to implement OAD milking onto farms, in particular the means of selecting cows suited to this system and ways of controlling the BMCC in mid to late lactation.

7. References and further reading

For more information on the topic you might try:

The DEXCEL website from New Zealand is pretty comprehensive- http://www.oadmilking.co.nz (or http://www.dexcel.co.nz).

Rémond B. and Pomiès D. (2004) Effect of once daily milking in dairy cows: a review of recent French experiences. 55th Annual Meeting of the European Association for Animal Production, Solvenia, Bled.