Milking options to increase flexibility and reduce hours of work

Summary

- Milking options are key in improving workplace attractiveness
- Once-a-day milking may be less suited to high producing farms (e.g. 400+ kg MS/cow) or with less ability to reduce costs (e.g. irrigation)
- An alternative option, 3in2 milking, has increased in popularity, particularly in the South Island
- A new project: ‘Flexible Milking’, was established to help farmers and advisors adopt, optimise, and/or support the use of 3in2
- Early experimental data suggest cows milked 3in2 produce approximately 4% less milksolids than TAD at each stage of lactation
- Interviews with farmers using 3in2 identified options for grazing management, mating, and tanker scheduling when using 3in2 milking

Why flexible milking, and what is it?

Attracting and retaining quality staff is a challenge faced by most dairy farmers. Its importance is recognised by the industry commitment to build great workplaces for NZ’s most talented workforce. Dairy farm work generally involves long hours (e.g. 60+ per week), many of which are spent at unsociable times of the day (e.g. 4 am starts), which reduces our competitiveness relative to other industries for talented staff.

On average, milking absorbs 17-24 hrs per farm worker per week, depending on herd size and dairy type. Traditionally, cows in NZ have been milked TAD with a 10-14 hr interval and, for larger herds, a 4 am start to the day. Thus, changing milking schedules provides an opportunity to reduce work hours, increase flexibility, and improve workplace attractiveness.

Once-a-day (OAD) milking is a strategy familiar to many farmers. The interval between milkings is extended to 24 hrs, halving the number of milkings. Flexibility is increased because milking can be set at any time during the day. On average, OAD reduces time spent milking by 9.5 hrs per person per week.

However, OAD is not a strategy that suits all farms. On average, on farms that have adopted OAD, milksolids (MS) production was reduced by 11%; however, this can vary depending on the farm system. Farm systems producing ≤300 kg MS/cow experienced minimal loss of production compared with systems producing >300 kg MS/cow (Figure 1). The ability to offset this loss in revenue will differ depending on the current farm system and cost structure.

Research in the 1950s and 1960s identified that the rate of milk secretion was linear up to around 16 hours. This led to the original concept of 16 hr milkings (25% fewer milkings than TAD) with theoretically little or no loss in production. Example milking times were 5am and 9pm on day 1 and 1pm on day 2. While some liked this approach, the strategy had limited uptake due to the unpopular late-night milking. Hence, farmers evolved the 16 hr intervals to 14-16-18 and more recently to 12-18-18, with some now extending this out to 8-20-20. However, many combinations are possible.

Figure 1. Milksolids production per cow before and after adopting OAD grouped by pre-OAD production (kg MS/cow). Year 0 represents the year the herd adopted OAD milking.
One variation is 10in7 which uses a 3in2 milking schedule for the weekdays, but OAD on Sunday, which results in an OAD weekend and a consistent milking schedule from week to week.

Milking 3in2 has grown in popularity with 7% of farmers using it for part of the 2017/18 season, and 12% using it in 2018/19. There is significant regional variation in adoption (Figure 2): 3in2 is most popular in the South Island (30% of farms) likely due to the prevalence of higher producing herds and less ability to reduce costs making OAD less appealing.

Figure 2. Regional use of different milking regimes from a survey of 500 farms in 2018/19

Flexible milking project

The flexible milking project, funded by MPI’s Sustainable Farming Fund and DairyNZ, started in July 2019 and will run for three years. The project aims to build the confidence of farmers and advisors to adopt, optimise, and/or support the use of 3-in-2 milking with the overall goal of enhanced wellbeing on-farm and workplace attractiveness while maintaining profitability. There are two aspects to this:

1) confidence in the decision whether to adopt 3in2
2) confidence in deciding when to use 3in2 (e.g. full season vs. start mid or late lactation).

A key barrier to building this confidence is the lack of knowledge on the impacts of 3-in-2 on system performance. Only one study has been conducted on the topic (presented at the 1985 Ruakura Farmers Conference), comparing an 11-18.5-18.5hr interval with TAD for a full lactation with 36 sets of twins. The authors reported a 6% decrease in milkfat production (182 v 171 kg/cow) over 255 days with 3in2. At the end of the lactation, 3in2 cows were 0.7 BCS units higher than those milked TAD. In the 35 years since this study, cow genetics and milk payment systems have changed.

In the first year of the project (2019/20) the main activities are: a) a farmlet experiment at the Lincoln University Research Dairy Farm (LURDF) to quantify the farm system effects of using 3in2 at different stages of lactation (see next section); and b) interviewing 12 farmers already using 3in2, covering different regions, business types, milking intervals and stages of lactation. The aim is to help identify challenges, solutions and FAQs farmers have when considering 3in2.

The plan in the second year is to develop resources based on information collected in year 1, piloting full season 3in2 milking on several commercial farms, and running a second experiment to further explore the impact of different milking intervals that better suit workplaces (e.g. 10-19-19). Key roles of the...
commercial pilot farms are to understand the impact of 3in2 on people and demonstrate the practice for those following the regular project updates.

The plan for the final year is to finalise resources based on feedback from the previous year and incorporate new knowledge from year 2. There is also an opportunity to explore combinations of different milking intervals under different scenarios using modelling.

**Early results from farmlet study**

The LURDF study compares different milking strategies in four farmlets of 29 cows stocked at 3.5 cows/ha. Milking options are outlined in Figure 3. Milking intervals are 10-14 in TAD and 12-18-18 in 3in2.

Each farmlet is managed independently using the same set of decision rules. The amount of nitrogen applied, estimated pasture grown (based on weekly farm walk data), the amount of supplement fed, and the amount silage conserved are presented in Table 1.

Preliminary data indicate minimal production losses with 3in2. In spring, cows milked 3in2 produced 10% less milk, but had a greater milksolids % (9.6 v 9.0 for 3in2 and TAD respectively), equating to 4% less MS (Table 2). This effect appears consistent over summer for both the cows that were switched to 3in2 in December, and the cows that were milked 3in2 for the full season. SCC was greater with 3in2 by 12,000 to 15,000 cells/mL, however, SCC levels are still relatively low. There have been 9 cows treated for mastitis in the full-season 3in2 herd, and 6 in the other herds. It is unlikely this will come through as a treatment effect.

![Figure 3. Illustration of the four farmlets in the 2019/20 experiment](image)

### Table 1. Cumulative amount of nitrogen, pasture grown, and silage made and fed season to date (20-Feb) for each farmlet.

<table>
<thead>
<tr>
<th>YTD figures</th>
<th>FS 3in2</th>
<th>Dec 3in2</th>
<th>Mar 3in2</th>
<th>FS TAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>N applied (kg N/ha)</td>
<td>144</td>
<td>144</td>
<td>144</td>
<td>144</td>
</tr>
<tr>
<td>Pasture growth (t DM/ha)</td>
<td>11.5</td>
<td>11.7</td>
<td>11.2</td>
<td>11.0</td>
</tr>
<tr>
<td>Silage fed (kg DM/cow)</td>
<td>214</td>
<td>105</td>
<td>142</td>
<td>96</td>
</tr>
<tr>
<td>Silage made (t DM/cow)</td>
<td>195</td>
<td>121</td>
<td>213</td>
<td>68</td>
</tr>
<tr>
<td>Net silage (kg DM/cow)</td>
<td>-18</td>
<td>16</td>
<td>71</td>
<td>-27</td>
</tr>
</tbody>
</table>

### Table 2. Comparison of milk production parameters between 3in2 and TAD milking intervals during Spring and Summer (up to 20-Feb).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Spring (Aug-Nov)</th>
<th>Summer (Dec-Feb)</th>
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<tbody>
<tr>
<td></td>
<td>3in2</td>
<td>TAD</td>
</tr>
<tr>
<td>Yield (kg/d)</td>
<td>20.7</td>
<td>23</td>
</tr>
<tr>
<td>Milksolids (kg/d)</td>
<td>1.97</td>
<td>2.05</td>
</tr>
<tr>
<td>SCC (cells/mL)</td>
<td>61,816</td>
<td>46,537</td>
</tr>
</tbody>
</table>
This experiment is ongoing: sign up to receive a fortnightly update on progress at www.dairynz.co.nz/3in2. A full farm system analysis will be conducted at the completion of the experiment.

Early results from farmer interviews
Some insights from the interviews with the 12 farmers using 3in2 are shared below.

Tanker schedule
Little change in tanker scheduling was required if the farm was on skip a day. However, on daily pickup, if the tanker comes in the same window each day, the best approach was to re-schedule to avoid the time between the AM and 11am milking (e.g. Figure 4). This prevented potential for (a) flooding the vat during peak lactation and (b) higher SCC and low volume on day 2.

Mating
Farmers are using a variety of options when milking 3in2 through mating, including:

1) Mating after every milking
   • where the AI technician was flexible, or the farm was using DIY mating

2) Mating at the same time each day
   • If mating after the AM milking, then cows to put up on day 2 would be selected at the PM milking on day 1 and grazed separately
   • If mating after the 11 am milking, cows to put up on day 1 would be selected at the AM milking on day 1 and grazed separately
   • If mating after the PM milking, then cows to put up on day 2 would be selected at the 11 am milking and grazed separately

3) Mating after the AM milking on day 1 and 11 am milking on day 2
   • where the AI technician was flexible to come at slightly different times and to avoid the hassle of having a separate AI mob every second day

Grazing
A range of grazing management/allocation approaches were being used on the 12 farms. Some offered a smaller area for the 12 hr interval and larger for the 18 hr intervals, whereas others offered the same amount at each interval on the assumption that the 12 hr grazing occurs during the day when cows are active grazers. The time of the year when 3in2 is used and subsequent grazing targets will impact on grazing management, with a farm’s paddock sizes influencing the ease of which these can be achieved. The general consensus was that the most effective strategy was to think about allocation on a 48 hr basis instead of 24 hr as it is easy to overcomplicate systems.