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An evaluation of traits other than production and its association with the survival of dairy cows milked once a day in New Zealand

A thesis presented in partial fulfilment of the requirements for the degree of

Master of AgriScience

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Abstract

New Zealand dairy cows have traditionally been milked twice a day (TAD). However, an increasing number of dairy farms have shifted to once a day (OAD) milking in the last few years for several reasons. A particular emphasis has been placed on the cow’s conformation and its management during the milking routine in OAD dairy farms, as these factors might have altered the culling decisions of herds after shifting from TAD to OAD milking. This thesis evaluates production traits and traits other than production (TOP) in the herd of Massey University Dairy 1 since the start of OAD milking and for three consecutive seasons (2013-2015), with an assessment of the influence that these traits have on the cow’s survival. Results showed a significant effect of breed, season and lactation on TOP. The scores for most udder traits showed a gradual decrease over lactations. The main reasons for culling were low fertility (37.2%), poor udder conformation (19.9%) and low production (12.8%). Hazard ratios from a Cox proportional hazard model showed that Holstein-Friesian and crossbred cows had a higher likelihood of culling than Jerseys, which also had the highest scores for most udder traits. For some TOP, such as adaptability to milking, rump angle and udder support, higher scores were associated with a lower likelihood of culling. However, intermediate scores were optimum for traits such as body capacity and leg conformation. The results of this thesis are the first to show culling reasons and risk factors for survival in cows recently shifted from TAD to OAD. The analyses of TOP over seasons and over lactations are also unique to this thesis as most studies on this topic only include TOP on first lactation cows. The findings of this thesis indicate that TOP would have a higher priority to make culling decisions in OAD herds during the transition from TAD to OAD milking, compared to TAD herds and also established OAD herds that have used this milking frequency for several seasons. Furthermore, besides body capacity and udder support, traits such as adaptability to milking, rump angle and leg conformation could also potentially be included in a new selection index for OAD dairy cattle.
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This work would have not been possible without the encouragement and support of LuzMa and Aleja. Thank you for always being there.

“... Hence, if man goes on selecting, and thus augmenting, any peculiarity, he will almost certainly modify unintentionally other parts of the structure, owing to the mysterious laws of correlation”

Charles Darwin
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<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>BW</td>
<td>Breeding worth</td>
</tr>
<tr>
<td>BCS</td>
<td>Body condition score</td>
</tr>
<tr>
<td>DM</td>
<td>Dry matter</td>
</tr>
<tr>
<td>EBV</td>
<td>Estimated breeding value</td>
</tr>
<tr>
<td>EV</td>
<td>Economic value</td>
</tr>
<tr>
<td>FY</td>
<td>Fat yield</td>
</tr>
<tr>
<td>F</td>
<td>Holstein-Friesian</td>
</tr>
<tr>
<td>FxJ</td>
<td>Holstein-Friesian and Jersey crossbred</td>
</tr>
<tr>
<td>J</td>
<td>Jersey</td>
</tr>
<tr>
<td>LIC</td>
<td>Livestock Improvement Corporation</td>
</tr>
<tr>
<td>LWT</td>
<td>Liveweight</td>
</tr>
<tr>
<td>MSY</td>
<td>Milk solids yield</td>
</tr>
<tr>
<td>MY</td>
<td>Milk yield</td>
</tr>
<tr>
<td>NI</td>
<td>Net income</td>
</tr>
<tr>
<td>OAD</td>
<td>Once a day</td>
</tr>
<tr>
<td>PV</td>
<td>Production value</td>
</tr>
<tr>
<td>PW</td>
<td>Production worth</td>
</tr>
<tr>
<td>PY</td>
<td>Protein yield</td>
</tr>
<tr>
<td>SCC</td>
<td>Somatic cell count</td>
</tr>
<tr>
<td>SCS</td>
<td>Somatic cell score</td>
</tr>
<tr>
<td>SMFS</td>
<td>Interval from start of mating to first service</td>
</tr>
<tr>
<td>SR21</td>
<td>Submission rate at 21 days after the start of breeding</td>
</tr>
<tr>
<td>SR42</td>
<td>Submission rate at 42 days after the start of breeding</td>
</tr>
<tr>
<td>TAD</td>
<td>Twice a day</td>
</tr>
<tr>
<td>TOP</td>
<td>Traits other than production</td>
</tr>
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</table>