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Quantifying the effect of the InCalf Farmer Action Group on seasonal-calving pasture-based dairy farms in New Zealand

A thesis presented in
partial fulfilment of the requirements
for the degree of Doctor of Philosophy
at Massey University

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2012
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Palmerston North, New Zealand
2012
Abstract

Dairy herd reproductive performance is purportedly in decline in New Zealand and internationally. The aetiology is multifactorial and complex and a broad range of hypotheses for this decline have been proposed, including cow and herd factors. An effective dairy industry needs optimal reproductive performance to maintain cattle welfare and a competitive advantage in the international marketplace. Six key herd-level management factors were identified as being associated with the reproductive performance in Australian seasonal-calving pasture-based dairy herds. A reproductive extension programme was built around these findings designed to enable farmers to improve reproductive performance on farm (InCalf). In 2008, the New Zealand dairy industry adapted InCalf for New Zealand conditions and made it available to dairy farmers and rural professionals. Coinciding with this programme development, the New Zealand dairy industry also set a national target of a herd-level average of 78% of cows pregnant by day 42 of the seasonal breeding period (6 week in-calf rate) by 2016. The last benchmarking of reproductive performance in the New Zealand dairy herd was undertaken in 1999-2000 and the first aim of this thesis was to estimate the current national-level for reproductive performance. Secondly, the effectiveness of farmer participation in the InCalf extension programme was quantified using a randomised controlled study.

This study found a 67% mean 6 week in-calf rate over both 2009/10 and 2010/11 study years amongst those herds allocated to a control group, reflecting similar findings to the previous benchmarking study. Although this finding suggests that overall reproductive performance has remained similar over the decade, conception to first mating (first service conception rate) has declined by 5% to 48% while the rate of breeding in the first 21 days of mating (3 week submission rate) has remained similar at 81% suggesting that the submission rate in the second 21 days of breeding has improved to account for the decline in first service conception rate. Change in behaviour in key management factors is needed in order to improve 6 week in-calf rate. Baseline interviews with farmers found general satisfaction with reproductive performance. This is a potential barrier to improvement, since dissatisfaction is needed to create the tension for change hypothesised to drive behavioural change.

This randomised controlled study found that farmer participation in regional InCalf extension programmes resulted in an average 2% improvement in reproductive performance during the year
of the intervention over herds where farmers did not participate \( (p = 0.05) \). The greatest effect was seen in the lowest performing herds and these should become the focus of future extension.

Herds participating in the InCalf extension programme had a significant improvement in heifer live-weight, premating mean body condition score and oestrus detection over herds that did not participate \( (p < 0.05) \). No significant difference was found in the distribution of calvings, anoestrous cow management or bull management. Improvements in the InCalf programme to achieve behaviour change for those management factors where the current InCalf has not proved effective may lift performance and further work is needed to evaluate the extent of the effect of participation on attitude change.

The industry must now decide if this is sufficient improvement in reproductive performance to invest further in this model of extension and whether to improve it using the recommendations from this thesis.
I arrived in New Zealand in 2007 as a dairy veterinarian with the intention to complete the Masters course in epidemiology offered by Massey University to improve my effectiveness as a vet. I did not expect this would lead to completing a doctoral thesis or running a national herd fertility study. On both counts I am very surprised and extraordinarily lucky! It has been a unique opportunity and its completion would have been improbable without the help from a large number of people and I am grateful for the opportunity to thank them!

First and foremost, I must thank my supervisors, Associate Professor Scott McDougall, Dr John Morton and Professor Cord Heuer. Scott’s vision for the New Zealand industry is imprinted on most of the daily decisions dairy practitioners make. It has been an honour to work alongside Scott and although I am sure that I often fell short on a multitude of occasions, I am pleased to have finally been able to write this! John’s patient method and technical expertise has improved this thesis and my writing enormously. You have been a tremendous teacher and I have learned a great deal. Thank you also to you and Jeanette for your hospitality when I visited Melbourne. Thank you Cord for putting me forward for this thesis and seeing an opportunity I might otherwise have missed.

Extra special thanks has to go to Dr Jaimie Hunnam, who (on an almost daily basis) picked up the pieces, massaged the crumpled ego and was extraordinarily generous with her time (and pinot gris). Thank you Jaimie, I would certainly still be floundering without you!

Thank you Fiona Rhodes for also committing so much time to proof reading these chapters and offering such constructive comment on both grammar and technical content.

Without the organised and endlessly resourceful Cathy, Jo, Laura and Elizabeth at Cognosco this would have been in a desperate pickle. Thank you for your help and chocolate.

Within each region, there were coordinating veterinarians, technicians and support staff that contributed over and above what was asked of them. I am proud to call them all friends! Thank you ever so much Katrina Roberts, Steve Harkness, Katie Denholm, Bryce Todd, Noelle Todd, Izzy Lees, Judith Forno, Andrew Weir, Joan Hughes, Kate Foxcroft, Jason Gill, Matt O’Sullivan and Jared Ovens.

Of course, thank you to all of the regional farmers and their families and staff involved in this study. We asked a lot of you all and managed to get it all done! I am still amazed about what we achieved.
So much was due to your patience, interest and questions. I hope that we have managed to answer a few. I hope that we will keep working to answer a great deal more.

This dataset was large and unwieldy and with so little experience at the outset I was fortunate for the support of extremely patient IT support and programmers. Without you I would still be stuck with very ambiguous outer joins. Thank you Ian Potts, John Featherston, Innes Fisher and Andy Taylor (and thank you Andy for an even more exciting method of filling the freezer).

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I was very fortunate that I wasn’t entirely alone during this project. I have made some incredible friends that put up with me (or the absence of me) throughout this adventure: Thank you Fran for caring so much! Thank you Dave and Amy for keeping my second bedroom so welcome; Martin and Jo for keeping my other second bedroom so welcome; Barney and Al (third, second bedroom); Melvin (your turn next buddy); Johnny (finally no more excuses...); Leslie (the communal peace keeper); Mark Wyllie (for the art of the pre written email) and Hayley (for those long conversations about lofty adventures – let’s hope we have some of them now!). Thank you all. I am very lucky.

Finally and most importantly, thank you to my father and the rest of my family. Dad, you’ve been my great believer, my support and the co-pilot on some iconic road trips over the last three years. I really don’t believe many sons are this lucky! Thank you. This thesis is certainly dedicated to you.

Finally finally, to those that sat on my feet throughout this whole endeavour, thank you Rabbit (and latterly Grub). To your relief, my student days are finally over, and as I promised, I will make it up to you!
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>KASA</td>
<td>Knowledge, Attitude, Skills and/or Aspirations</td>
</tr>
<tr>
<td>KDM</td>
<td>Key decision maker</td>
</tr>
<tr>
<td>LIC</td>
<td>Livestock Improvement corporation</td>
</tr>
<tr>
<td>MSD</td>
<td>Mating start date</td>
</tr>
<tr>
<td>PSC</td>
<td>Planned start of calving</td>
</tr>
<tr>
<td>PSM</td>
<td>Planned start of mating</td>
</tr>
<tr>
<td>RCT</td>
<td>Randomised Controlled Trial</td>
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</tbody>
</table>
List of Publications

2012


2011


Brownlie T. InCalf, preliminary results form the New Zealand National Herd Fertility Study. *Proceedings of the Australiand College of Veterinary Scientists College Science Week*, Gold Coast, Australia 2011


2010


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