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to read previous issues of Dairy Research Review

Welcome to the twelfth issue of Dairy Research Review.

Highlights in this issue, which is entirely devoted to dairy cows, include genomic selection and breeding programme efficiency, dietary supplementation for hypocalcaemia, prevalence of hypocalcaemia and strategies to prevent it, and the efficacy (or otherwise) of non-antibiotic treatments for mastitis. Of special interest is a NZ study that could be the first published prospective investigation of calf mortality and associated risk factors, during the peri-natal and post-natal periods, in pasture-based dairy herds. Concluding this issue are two papers from Brazilian researchers that investigate relationships between lying behaviour and fertility and between heifer growth and mammary development.

We hope that the research reported in this issue of Dairy Research Review is thought-provoking and applicable in your local practice. We look forward to receiving your feedback and comments.

Kind regards

Hamish Newton

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Research Review thanks MSD Animal Health for their sponsorship of this publication, and their support for ongoing education for animal health professionals.

Invited review: A perspective on the future of genomic selection in dairy cattle

Authors: Weller JI et al.

Summary: This article discusses what has been learned from almost two generations of the application of genomic selection in dairy cow farming, changes that have already occurred as well as likely future changes, and how these changes will affect the future of the dairy industry globally.

Comment: This is a review paper of what has happened as result of genomic selection of dairy cattle and tries to predict what will be the future. The major driver of the uptake of the technology is the reduction in the cost of the testing; for example, when the 50K SNP chips were made available in 2010 they were in the region of \$500 per animal and are now around \$50 and the lower density chips are even cheaper. Prior to genomic evaluation, the gains in efficiency of breeding programmes were minimal once the population of recorded females was greater than 100,000 cows so there were many national breeding programmes and even programmes for breeds within countries. With genomic evaluation there is consensus that the factor limiting accuracy is the number of genotyped bulls with daughter records. This has resulted in consortiums having to pool resources across countries to increase accuracy. The number of bulls with progeny test daughters has decreased (by up to 50%) and the number of daughters per bull has increased. The paternity misidentification rate in "advanced breeding populations" was estimated to be in the region of 5% to 12% prior to genomic testing, this as a by-product of genotyping will have been almost eliminated and should increase the rate of genetic gain. Genomic evaluation allows the inclusion of more traits in the selection indices. It is expected there will more emphasis placed on health and reproduction traits, production efficiency traits, and traits for reduced waste and gas emissions. It has become apparent that a very large number of genes affect almost all of the economically important traits. This is still relatively new technology and there is still the need to have progeny records for what we can easily measure (herd test data) and it seems we will also need to devise cost-effective ways to measure production efficiency and gas emissions, etc. It will be interesting to see what has actually happened in another 10 years.

Reference: *J Dairy Sci.* 2017;100(11):8633-8644

[Abstract](#)



The effect of source of supplemental dietary calcium and magnesium in the peripartum period, and level of dietary magnesium postpartum, on mineral status, performance, and energy metabolites in multiparous Holstein cows

Authors: Leno BM et al.

Summary: This study showed that changing supplemental Ca and Mg sources and feeding rates had little effect on plasma Ca status despite differences in plasma Mg and P concentrations in transition dairy cows.

Comment: I assume I am no different to any other vet and still see hypocalcaemia cows around calving time and expect to see it again next year despite standard advice. This study looked at different mineral supplements and levels pre- and post-partum. The authors of this study acknowledge that the power of this study is low, so no obvious conclusions can be drawn. The discussion, due to the lack of findings, is necessarily vague but covers MUN, NEFAs, serum levels of Ca, Mg, and P, dry matter intake, rumen pH, and buffers. If you are seeing more down cows or down cows later in lactation, then this article although giving no answers does start to explain some of mechanisms at play and the different availabilities of Mg sources. What was surprising was much of the work cited that has investigated Ca and Mg supplementation was done on sheep or steers. It was worth reading just to reinforce we still do not know enough about a well-recognised disease. I have no doubt we will still be treating down cows next spring.

Reference: *J Dairy Sci.* 2017;100(9):7183–7197

[Abstract](#)

Hypocalcaemia–Cow-level prevalence and preventive strategies in German dairy herds

Authors: Venjakob PL et al.

Summary: This study identified a high prevalence of clinical and subclinical hypocalcaemia in German dairy herds and that an active control strategy was not implemented on all farms. A negative association between serum Ca and Mg levels warrants further investigation in terms of the physiological regulation of these two minerals around parturition.

Comment: To carry on the hypocalcaemia theme, this is a paper describing a cross-sectional study looking at the prevalence of clinical and subclinical hypocalcaemia in German dairy herds within 48 hours of calving. The authors describe hypocalcaemia a “gateway disease”, which suddenly makes dealing with a routine disease more interesting and reminds us that we are not just dealing with a down cow. Hypocalcaemia can predispose to LDAs, metritis, and mastitis. The serum Ca value of <2.0 mmol/L was used as the threshold for defining hypocalcaemia, although higher levels have also been associated with negative health or production outcomes. Twelve cows per farm were sampled and the number of samples <2 mmol/L was used to classify the herd as negative (≤2 of 12 cows with Ca <2 mmol/L), borderline (3 to 5 cows with Ca <2 mmol/L), or positive (≥6 cows with Ca <2 mmol/L). The authors did not find a significant effect of breed, time of sampling relative to calving, or calving ease on the serum Ca level. This should make selecting cows for sampling relatively straightforward if you are worried about getting a representative sample of the colostrum cows. However, there was an increased prevalence of hypocalcaemia with parity. It might pay therefore to sample first and second calvers separately from the mixed-age cows.

Reference: *J Dairy Sci.* 2017;100(11):9258–9266

[Abstract](#)

Independent commentary by Hamish Newton.

Hamish Newton graduated from Massey University with a BVSc in 1998 and started working in mixed practice at the Veterinary Centre – Oamaru. He then worked in mixed practice in the UK before starting a PhD at Bristol University examining factors that influence the cure of intramammary infections in the involuting mammary gland. Upon completing his PhD in 2007 he returned to the Veterinary Centre – Oamaru and became a partner in 2008. He now spends most of his working time dealing with dairy cows.



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Dairy Research Review

Evidence that mastitis can cause pregnancy loss in dairy cows: A systematic review of observational studies

Authors: Dahl MO et al.

Summary: This systematic review of the literature was conducted to identify and evaluate evidence and knowledge gaps in published observational studies that have investigated the relationship between mastitis and pregnancy loss in dairy cows.

Comment: This paper examined papers looking at pregnancy loss and mastitis. Pregnancy loss is the loss of a pregnancy that was confirmed 30 to 50 days post-AI that subsequently showed signs of abortion or was confirmed empty at a repeat pregnancy test. Thus, this paper does not examine the effect of mastitis on either conception or submission rates. Eight studies are summarised with varying results ranging from an increased odds of pregnancy loss of 2.8-times if clinical mastitis occurred in the first 45 days of gestation to odds being 3.6-times higher if mastitis occurred in the 30 days pre-AI. If mastitis occurred in the first 70 days of lactation the odds of pregnancy loss was 2. This review does support the view that mastitis can cause pregnancy loss. This is no surprise especially if you have looked at pregnancy rates by diagnosis (mastitis or lameness in MINDA live) but of course those analyses do not just look at pregnancy loss but will also include reduced submission rates and conception rates.

Reference: *J Dairy Sci.* 2017;100(10):8322–8329

[Abstract](#)

Calf and replacement heifer mortality from birth until weaning in pasture-based dairy herds in New Zealand

Authors: Cuttance EL et al.

Summary: This prospective study demonstrated that the mortality risk of peri-natal calves and post-natal calves until weaning on pasture-based farms is comparable with data from other dairying systems despite the obvious management differences.

Comment: This prospective survey of 32 farms looked at both peri-natal mortality (birth to 24 hours) and post-natal mortality (24 hours to weaning at an average age of 13 weeks). The average peri-natal mortality was 5.7% and this risk did not change with the stage of the calving season unless a calf was born before the planned start of calving. The range across farms varied from 2.2% to 8.6%. For each 10mm of rainfall on the day of birth, the odds of death increased by 8%. Surprisingly, daily max or min temperature did not contribute to peri-natal mortality, but wind speed data were not able to be collected so "wind-chill" would not be accounted for. At the farm level, peri-natal mortality increased with increasing length of the calving period. Having a male calf rearer was associated with lower perinatal mortality but all the male calf rearers in the study were owner-operators so may be confounded. The average post-natal mortality was 4.1% (24 hours of age to weaning at approx. 13 weeks). Farms that reported disease in calf sheds (diarrhoea, pneumonia, or navel ill) had 2.2-times greater odds of calves dying in the post-natal period. Contrary to what I want to believe, the post-natal mortality was higher in calves that were removed from their dam and hand fed colostrum within 12 hours compared with calves that received hand-fed colostrum between 12 and 24 hours of age. The author postulates that the early-fed calves were more likely to have failure of passive transfer due to poor quality colostrum (low Ab concentration and high bacterial counts). This highlights the importance of good colostrum management. The range in post-natal mortality by farm was from 0% to 11%, which suggests that on the high-mortality farms there can be changes implemented to achieve much lower mortality.

Reference: *J Dairy Sci.* 2017;100(10):8347–8357

[Abstract](#)

Using Dairy Research Review for CPD points

Reading relevant veterinary articles such as those in Dairy Research Review is a valuable way to keep current and can become part of your CPD record. Simply record the activity on your activity record and create a reflective record by writing a few sentences about what you learnt and how this impacts your practice as a veterinarian.

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Effects of monensin on glucose metabolism in transition dairy cows

Authors: Markantonatos X et al.

Summary: The results of this study suggest that monensin improves the energy status of transition cows by increasing the efficiency of propionate to produce glucose and by decreasing glucose oxidation in body tissues.

Comment: Here is yet another paper about monensin. This paper examined what happens to the plasma glucose levels in cows fed monensin pre- and post-partum. The physiology and pathways of propionate and glucose metabolism are far more complicated than I remember but if you want a very in-depth refresher on what you either never learnt or what you have forgotten about physiology and pharmacokinetics then this paper is for you. For the rest of us, monensin improves the metabolic status of a transition cow. The method by which it does this is by increasing the efficiency of gluconeogenesis by increasing the propionate contribution and decreasing the glucose contribution from other sources (starches and lactates). So, yet another paper showing us that monensin works, it is just a matter of getting into our transition cows.

Reference: *J Dairy Sci.* 2017;100(11):9020–9035

[Abstract](#)

Invited review: A systematic review and qualitative analysis of treatments other than conventional antimicrobials for clinical mastitis in dairy cows

Authors: Francoz D et al.

Summary: The authors of this systematic review of the literature conclude that no evidence-based recommendations could be given for the use of an alternative or non-antimicrobial conventional treatment for clinical mastitis. However, probiotics and oxytocin with or without frequent milk out should not be recommended and homeopathic treatments are not efficient for management of clinical mastitis.

Comment: This paper has pulled together the data on the efficacy of non-antibiotic treatment for mastitis. Only studies that had a positive or negative control were analysed. Non-antibiotic treatments that were evaluated included, anti-inflammatory drugs, oxytocin (with or without frequent milk out), biologics, homeopathy, botanicals (e.g., aromatherapy), probiotics, and two other “alternative products”. I expect we will get more queries about the use of alternative treatments for mastitis with the push to reduce the amount of antibiotics we use. One potential bias of this systematic review that the authors identified was that they restricted the papers evaluated to English and French. This resulted in 42% of the potentially relevant papers being excluded and no articles about acupuncture being evaluated. This review provides no evidence that we could use to give evidence-based recommendations supporting the use of alternative mastitis treatments. There is evidence that would suggest that we do not recommend probiotics and oxytocin though as it seems to be detrimental.

Reference: *J Dairy Sci.* 2017;100(10):7751–7770

[Abstract](#)



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Herd-level prevalence of selected endemic infectious diseases of dairy cows in Great Britain

Authors: Velasova M et al.

Summary: This study found that dairy herds in Great Britain are often exposed to several endemic pathogens that are prevalent at high levels and exhibit some geographical variations. The authors concluded that, in view of the burden to efficient production posed by these pathogens, interventions to control and potentially eliminate some of these pathogens should be considered.

Comment: I assume some of you will be off an OE at some stage and many will go to the UK and hopefully you manage to get a dairy or mixed job rather than one clipping rabbits' toenails in London. This paper gives a snapshot of the prevalence of some endemic diseases that you are likely to encounter. All the data was derived from bulk milk samples so has some limitations and may underestimate the prevalence of diseases that result in animals being less likely to make it into the milking herd or remain in the herd such as BVD. Only farms that were not vaccinating for a specific disease were included in the analyses and there were many farms excluded due to this, especially for BVD, BHV-1, and leptospirosis, so expect to deal with vaccination programmes for these diseases in particular. There were regional differences in the prevalence of disease that was explained by the density of cows per Ha. There were also regional differences in the prevalence of Ostertagia and Fasciola that are probably explained by rainfall and grazing practices.

Reference: *J Dairy Sci.* 2017;100(11):9215–9233

[Abstract](#)

Daily lying behavior of lactating Holstein cows during an estrus synchronization protocol and its associations with fertility

Authors: Silper BF et al.

Summary: The aims of this study were to quantify lying behaviour during an oestradiol- and progesterone-based synchronisation protocol, assess risk factors for ovulation, pregnancy per AI, and degree of behavioural change at oestrus, and investigate associations between oestrus lying behaviour and walking activity.

Comment: This study used synchronised cows to evaluate the lying behaviour of cows as they came into heat. As physical activity increases at oestrus, it seems intuitive that the amount of time lying and the number of lying events would decrease although in this study lying time and walking activity were not highly correlated. With the use of pedometers and other sensors, activity and lying can now be measured. This study was done on one 1700-cow farm that housed the cows in a free-stall barn in Brazil using cows that were synchronised. Seven days prior to fixed-time AI, the average lying time was 695 minutes per day (approx. 11.5 hours), which seems a long time when I think about the day of a dairy cow in NZ, but I have no data to back that up. The cows that had a greater change (decrease) in the amount of time lying had a higher ovulation rate and pregnancy rate. This supports the other studies showing the intensity of the heat is associated with better pregnancy rates. There is a discussion about the milk yield affecting the duration of oestrus and this study showed that cows producing more than the average milk yield had a smaller change in lying time. However, to confuse things a bit more, higher milk yield was associated with higher ovulation and pregnancy rates, perhaps because the higher producing cows in a herd are likely to be the healthiest? This data could feed into the algorithms that predict heat with the collars and pedometers that are becoming more common. Perhaps a measure of the intensity of the heat could be used to make decisions about what semen to use, e.g., sexed or conventional.

Reference: *J Dairy Sci.* 2017;100(10):8484–8495

[Abstract](#)

Performance strategies affect mammary gland development in prepubertal heifers

Authors: Albino RL et al.

Summary: These researchers demonstrated that high average daily gains achieved by feeding different amounts of a common diet during the growing period negatively affected mammary development in crossbreed heifers and had minor effects on blood hormone levels and biometric measurements.

Comment: This study, which was also conducted in Brazil, examined 100kg calves fed to achieve three different growth rates (1 kg/d, 0.5 kg/d, and “maintenance” that grew at 0.1 kg/d) for 84 days. It has been shown that Holsteins whose growth rates exceed 800g per day have the potential to have reduced milk production. As expected, the calves that were fed the best had heavier carcasses with more fat and protein. However, at the conclusion of the experiment, the height of all the heifers was similar so weighing calves is still the best way to monitor calf growth. The udders of the fast-grown heifers were heavier than the udders from the heifers fed at “maintenance” but the percentage of the udder that was actual parenchyma was lower than in either of the slower grown heifer groups. The authors conclude from this that growing the heifers at 100g/day “negatively affected mammary development”. As these heifers were slaughtered at the end of the study prior to reaching puberty or actually making any milk, the real effect on their ability to make milk seems unclear to me. I suspect most heifer growth problems we will ever deal with will continue to be under-grown heifers.

Reference: *J Dairy Sci.* 2017;100(10):8033–8042

[Abstract](#)