



Dairy Research Review™

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Welcome to the eleventh issue of Dairy Research Review.

Dairy cow farming dominates this issue in its entirety. The new research covered includes important facets of calving, mastitis, and feeding and grazing, as well as predicting conception and the lurking threat of digital dermatitis in NZ.

We hope that the knowledge and insights contained in this issue of Dairy Research Review benefit your practice. As ever, 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.

Abrupt weaning reduces postweaning growth and is associated with alterations in gastrointestinal markers of development in dairy calves fed an elevated plane of nutrition during the preweaning period

Authors: Steele MA et al.

Summary: This randomised study characterised the effect of an abrupt (0 days step-down) or gradual (12 days step-down) feeding regimen when calves were fed an elevated level of nutrition. The demonstrated benefits of a step-down feeding strategy, from an overall energy balance standpoint, were due to increased adaptation of the gastrointestinal tract preweaning.

Comment: This Canadian study looked at the method of weaning after calves were fed on elevated rather than restricted levels of milk (approx. 20% or 10% of the calves' body weight). There is evidence that calves fed elevated levels of milk have improved health, growth rates, feed efficiency, and lifetime production. However, this approach has not been widely adopted due to the concern that it results in decreased growth and rumen development during weaning. In this study, calves were either abruptly weaned off at 48 days of age or else were gradually weaned at 48 days after having the milk gradually reduced from day 36. A step-down weaning resulted in heavier calves at day 48 and increased feed efficiency. Post weaning there were no real differences in rumen morphology or biomarkers used to assess rumen function. There was, however, increased levels of faecal starch in the abruptly weaned calves, which could suggest that lower gut function was impaired. Under the conditions in this study, it would seem that a gradual weaning will increase the feed efficiency up until weaning. We need to remember that the level of milk feeding in this study is not typical for most of our clients.

Reference: *J Dairy Sci.* 2017;100(7):5390–5399

[Abstract](#)



Machine-learning-based calving prediction from activity, lying, and ruminating behaviors in dairy cattle

Authors: Borchers MR et al.

Summary: This US study used automated activity, lying, and rumination monitors to characterise prepartum behaviour and predict calving in dairy cattle (primiparous and multiparous Holstein cows) monitored for 28 days before predicted calving. Based on changes in behaviour and machine-learning alerts, the study authors concluded that behavioural monitors may have potential in predicting calving.

Comment: Monitoring tools used for estrus detection and health alerts are now available and used in NZ. They commonly measure rumination and activity, or activity and lying behaviour. This study looked at a tag that measured rumination and neck activity and a pedometer that measured activity and lying behaviours, both separately and in combination. It was found that primiparous cows lay less and became more active before calving than multiparous cows. Rumination time decreased to its lowest value 8 hours before calving then increased in the 8 hours before calving, but values remained far below baseline values. Lying times were least on the final day before calving for both parities (primiparous, 7.0 hours; multiparous, 10.2 hours) then lying time increased and exceeded baseline values 4 hours before calving, indicating a return to normal behaviour. This behavioural change indicates that although daily lying time decreased on the day of calving, cows lay more in the hours immediately preceding calving, which is no surprise. Similarly, lying bouts increased on the day before calving. Cows also steadily increased their lying-bout frequency per 2-hour period on the day of calving. These changes allow the prediction of calving day and even down to the correct 8-hour period. It will be interesting to see if this level of precision is of value to farmers in NZ calving outside. In a housed system, with cows being moved to individual calving pens when calving is imminent, getting the timing right would allow better use of resources and staff.

Reference: *J Dairy Sci.* 2017;100(7):5664–5674

[Abstract](#)

Independent commentary by Hamish Newton.

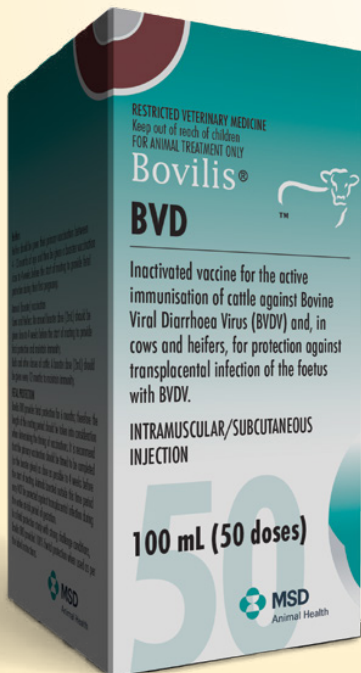


Hamish Newton graduated from Massey University with a BVSc in 1998 and started working in mixed practice at the Veterinary Centre – Oamaru. He then worked in mixed practice in the UK before starting a PhD at Bristol University examining factors that influence the cure of intramammary infections in the 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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Short communication: Detection and monitoring of metritis in dairy cows using an automated grooming device

Authors: Mandel R et al.

Summary: These researchers evaluated the efficacy of monitoring low-resilience activities in the early detection of metritis. Data on daily brush usage were collected from 28 metritic and 60 control cows 28 days postpartum using a customised automated monitoring system. Based on the results, the researchers concluded that adding on-farm monitoring of low-resilience behaviours to monitoring of core behaviours may be a better method for detecting events that compromise the welfare of animals and monitoring progress of recovery from disease after treatment.

Comment: By the time this is gets read there will be very few of us who are not actively looking for cows with metritis. This study used cow behaviour to identify cows with metritis. We are seeing greater usage of pedometers and rumination monitors to detect disease in New Zealand. These measure behaviours that are essential for short-term survival and hence may not change until a disease is more advanced. This study examined what is termed a "low resilience activity". These are behaviours that reduce when the cost of the behaviour increases or energy is limiting (also called luxury behaviours). An example, which will be of no practical use to us, is that the use of climbing equipment by female R6/1 transgenic Huntington's disease mice decreased before signs of disease were noted. In this study, the "luxury" behaviour was the use of a grooming brush. Use of brushes, especially those distant from the cows living areas, decreased in cows diagnosed with metritis. In the future, measuring low-resilience behaviours along with core behaviours (walking, rumination, etc) has the potential to increase the sensitivity of detecting disease and allow better monitoring of recovery.

Reference: *J Dairy Sci.* 2017;100(7):5724–5728

[Abstract](#)

Distribution of non-aureus staphylococci species in udder quarters with low and high somatic cell count, and clinical mastitis

Authors: Condas LAZ et al.

Summary: This Canadian cohort study measured: (1) the bulk milk somatic cell count (SCC) of quarters infected by individual non-aureus staphylococci (NAS) species compared with NAS as a group, culture-negative, and major pathogen-infected quarters; (2) the distribution of NAS species isolated from quarters with low SCC and high SCC, and clinical mastitis; and (3) the prevalence of NAS species across quarters with low and high SCC. The prevalence of clinical mastitis with almost all NAS species was higher in high SCC than in low SCC quarters; however, the distribution of NAS species differed in high SCC quarters versus low SCC quarters.

Comment: The NAS are large group of bacteria and are considered minor pathogens but in low-SCC herds are responsible for a large proportion of the SCC. As a group, they have been reported to both predispose and protect against infection with major pathogens. Infection with a NAS resulted in a quarter SCC that was intermediate between quarters with no growth and quarters with a major pathogen. The study identified species that were most likely to be involved in clinical mastitis and others were more likely to be associated with a high-quarter SCC. Although as clinicians we don't have access to the same level of speciation, this sort of study will allow researchers to examine specific species and explains some of the conflicting results that have been reported about the group as whole.

Reference: *J Dairy Sci.* 2017;100(7):5613–5627

[Abstract](#)

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Animal Health publications are intended for those with a professional interest in the animal health sector.



The use of national-level data to describe trends in intramammary antimicrobial usage on Irish dairy farms from 2003 to 2015

Authors: Moore SJ et al.

Summary: These researchers analysed national-level data to describe trends in on-farm intramammary antimicrobial usage in Ireland during 2003–2015. They calculated actual sales of intramammary tubes and the quantity of active substance sold and estimated on-farm usage of lactation and dry cow intramammary antimicrobials. The results suggested that blanket dry cow therapy (DCT) in Ireland should be reconsidered. The researchers concluded that central collation of data on farm-level antimicrobial use is required to enable objective measurement and benchmarking of on-farm usage.

Comment: This paper describes the change in usage of intramammary antimicrobials in Ireland from 2003 to 2015. It describes the amount of intramammary antimicrobials sold by year, lactation versus DCT, and classification, and, for the later years, the route of prescribing. In 2014, only 3.8% of the veterinary antimicrobials sold in Ireland were for intramammary use. I do not know of a comparable figure in NZ but suspect it would be much higher. Ireland is in a similar position to NZ as, at present, it is not able to examine antimicrobial use at farm level but can at a national level. The data for this paper came from sales data from the wholesalers who account for approximately 85% of sales in Ireland. As the data looked solely at intramammary tubes (rather than injectables for example) this is likely to give a very good idea of what is going on as these products can really only be used in their intended way in their intended species. The data showed a reduction in the number of intramammary courses per cow over the study period. Over the course of the study, the use of DCT also increased to 100% (and exceeded 100% in some years) and there was also an increase in the use of teat sealants, which were being used in addition to DCT rather than as an replacement. The authors discuss the need for selective dry cow therapy and the current limitations to that occurring. In 2015, herd testing was performed on 39% of dairy farms (52% of cows) with an average of 4.5 tests a year. There was an increase in the use of critically important antibiotics (CIA) in both lactating and dry cow intramammary therapies. In the discussion, there are examples of ways some countries have started to address this; for example, different tax rates on different compounds and restrictions on how they can be prescribed. This paper is well worth reading to get your head around the different measures of antibiotic use and is a great summary of what is happening not just in Ireland but in Europe as well.

Reference *J Dairy Sci.* 2017;100(8):6400–6413
[Abstract](#)

Quarter- and cow-level risk factors for intramammary infection with coagulase-negative staphylococci species in Swiss dairy cows

Authors: Dolder C et al.

Summary: This one-year longitudinal study evaluated the bacteriological status, udder hygiene, and teat end-scores of dairy cows on three Swiss dairy farms to determine risk factors for intramammary infection (IMI) with coagulase-negative staphylococci (CNS) species. The main findings included the summer and early autumn months being associated with a *Staphylococcus haemolyticus*, *Staph. chromogenes*, and *Staph. xylosum* IMI. In contrast, the risk for *Staph. warneri*-like species IMI was increased during the indoor period. Co-infections were identified for *Staph. haemolyticus*, *Staph. xylosum*, and *Staph. warneri*-like IMI.

Comment: This study set out to find cow and quarter level risk factors for infection with common CNS species (*Staph. chromogenes*, *Staph. haemolyticus*, *Staph. xylosum*, and a *Staph. warneri*-like species) in three Swiss dairy herds. The prevalence of the species identified on the three farms varied especially with the *Staph. warneri*-like species. Interestingly, quarter level factors such as teat end-score, warts, etc, were not identified as risk factors for infections with the species examined here. This contrasts with other studies where teat end-scores were risk factors for infection with *Staph aureus*, *Strep uberis* and *Escherichia coli*. Calendar month was a risk factor for infection, but different months were associated with increased risk for different species. This likely represents different housing management of the cows and exposure to different environments. Days in milk (DIM) was also a significant risk factor for *Staph. xylosum* (highest risk for cows <60 DIM) and for *Staph. warneri*-like species but the highest risk was for cows >120 DIM. It seems that the relative prevalence of the different CNS species varies between farms and with time of the year and DIM so until we have cost-effective speciation I suspect we will still use the prevalence of CNS as an indicator of teat hygiene and teat spraying.

Reference: *J Dairy Sci.* 2017;100(7):5653–5663

[Abstract](#)

Thiamine supplementation facilitates thiamine transporter expression in the rumen epithelium and attenuates high-grain-induced inflammation in low-yielding dairy cows

Authors: Pan XH et al.

Summary: These Chinese researchers tested the hypothesis that thiamine absorption in rumen epithelium can be blocked by high-grain feeding in dairy cows and evaluated the protective properties of thiamine supplementation. They concluded that a high-grain diet inhibits thiamine transporter expression in ruminal epithelium and that thiamine supplementation appeared to attenuate epithelial inflammation during high-grain feeding possibly due to its ability to suppress TLR4-mediated NFκB signaling pathways.

Comment: I suspect all of us deal with the odd acidotic cow and if you are south of Culverden unfortunately you'd deal with outbreaks of acidosis associated with the unintentional misallocation of fodderbeet. Although this study did not deal with cows with clinical acidosis it did alter the cows' diet with grain to reduce the rumen pH. During ruminal acidosis, there is reduced thiamine synthesis and increased degradation of thiamine. Additionally, due to pH gradient, it would appear that the active transport of free thiamine across the rumen wall is also decreased. Previous studies by the authors had shown that thiamine supplementation in cows on high-grain diets increased rumen pH and decreased rumen lactate levels. Other studies have also shown thiamine supplementation in SARA cows reduced the population of *Streptococcus bovis*. This trial had three treatments, a control diet, a high-grain diet, and the high-grain diet with thiamine. The thiamine supplemented diet resulted in higher yields of milk fat and protein compared to the other diets. The rumen pH was different between all treatment groups with the lowest in the high-grain group and the highest in the control diet. The high-grain diet resulted in more endotoxin lipopolysaccharide in the rumen fluid and this was significantly reduced by thiamine supplementation. Cows fed high-grain diets had lower concentrations of thiamine in both the serum and rumen fluid compared with cows on the control diet and these changes were reversed by thiamine supplementation. Thiamine supplementation also increased the mRNA expression of the three thiamine transporters. If you treat acidosis cows or have ever wondered why oral supplementation with thiamine appears to stop an outbreak of PEM this paper is well worth reading in full.

Reference: *J Dairy Sci.* 2017;100(7):5329–5342

[Abstract](#)

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Milk production and composition, nitrogen utilization, and grazing behavior of late-lactation dairy cows as affected by time of allocation of a fresh strip of pasture

Authors: Vibart RE et al.

Summary: In this NZ study, late-lactation dairy cows were used to examine the effects of allocating a new pasture strip in the morning or in the afternoon on milk production and composition and nitrogen utilisation. A fresh strip of pasture later in the day resulted in moderate increases in milk and milk solids yields. Conversely, a higher concentration of precursor fatty acids in morning herbage resulted in a higher concentration of beneficial fatty acids in milk versus with cows on afternoon herbage.

Comment: This study examined if the timing of when cows are offered their new break of grass makes a difference to production. As the dry matter (DM) and water-soluble carbohydrate (WSC) percentages tend to increase through the day due to photosynthesis this seems plausible. The DM% in the breaks offered after the afternoon milking was higher (22.7 vs 19.9%) as was the WSC% (10.9 vs 7.6%). The concentration of both neutral detergent fibre and crude protein was less in the afternoon breaks. The concentration of metabolizable energy remained the same though (11.4 MJME/kg DM). Although the estimated DM intake was similar, the cows offered their break after the morning milking had greater daily milk, fat, and protein yields. It was stated that about 70% of a cow's daily pasture intake occurs in the first 3 to 4.5 hours after being allocated a new break. The pasture offered in the afternoon seemed to be a "better diet" as it resulted in more solids this is an interesting paper. What I have not summarised here is the make-up of the fats, which may become more important in the future for manufacturing or marketing reasons.

Reference *J Dairy Sci.* 2017;100(7):5305–5318

[Abstract](#)

The creation and evaluation of a model predicting the probability of conception in seasonal-calving, pasture-based dairy cows

Authors: Fenlon C et al.

Summary: To develop a predictive model of conception, these researchers assessed factors of submission and conception in relation to service-level probability of conception in seasonal-calving pasture-based dairy cows. The model, which included both genetic and phenotypic variables and interactions between them, was successful in providing an accurate estimate of the probability of conception.

Comment: This paper describes a model that was developed to predict conception in seasonally calving pasture-fed cows in Ireland. It was found that days in milk, parity, genetics, and body condition score all influenced the outcome of conception, or not, in the model. Year was included in the model as a random effect as the authors wanted to create a model that was able to predict conception at the cow level across years. Similarly, the farm in this model was included as a random effect despite in other models the previous reproductive performance on each farm being an important part of the model. Although this model is generalizable to all cows its accuracy could be improved by putting in year and farm if those effects were known at the time of using it. The use of these sorts of tools might become more widespread in the future if decisions about what semen gets used on a particular cow get made; for example, if there is a low chance of conception use a low-cost straw or run with the bull, or if there is a high chance of conception use sexed semen.

Reference: *J Dairy Sci.* 2017;100(7):5550–5563

[Abstract](#)

Farm and cow-level prevalence of bovine digital dermatitis on dairy farms in Taranaki, New Zealand

Authors: Yang DA et al.

Summary: This cross-sectional study investigated the herd and cow level prevalence and patterns of bovine digital dermatitis (BDD) in dairy farms in the northern Taranaki region. The study found that BDD was widespread among the survey farms but there was no evidence of spatial clustering of herds with BDD. The cow-level prevalence on affected farms was lower than that reported elsewhere.

Comment: It seems that BDD is not just a disease of housed cattle as this paper describes the situation in Chile and the apparent lack of difference in the Netherlands between pastured and housed cattle and lack of seasonal difference in the UK in the prevalence of the disease. I imagine most of us over the last few years have seen this disease occasionally but thought of it as a bit of an oddity or an interesting finding. This study puts some numbers on the size of the problem. Cows had their hind feet examined during a milking. Sixty-four percent of farms had at least one cow with BDD. The prevalence on farm was 0% for 36% of farms and, >0% and <3% on 53% of farms. If a farm was BDD positive, the overall prevalence was 1.7%. The prevalence reported here is very low compared to what is seen overseas; however, this could change. It is interesting that it appears that the disease is widely spread (at least in northern Taranaki) and I suspect the situation would not be too different in the rest of the country. BDD is a disease that has the potential to become a big issue, despite our pasture-based systems, as has been seen in Chile. We need to have this disease as a differential for a lameness outbreak as it may not remain at the low levels reported here. Please don't forget *Mycoplasma bovis* though!

Reference: *N Z Vet J.* 2017;65(5):252–256

[Abstract](#)

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