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Issue 16 – 2018

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## Welcome to the sixteenth issue of Dairy Research Review.

Selections in this issue include the indirect testing of milk samples to predict mastitis at drying off, eradication of a highly contagious Staphylococcal strain from a dairy herd, pre-calving administration of meloxicam to increase milk yield in eutocic cows, and the effect of age of disbudding on healing and pain sensitivity in dairy calves. In other papers, factors associated with colostrum quality and passive transfer status of dairy calves are assessed and the usefulness of milk pregnancy-associated glycoproteins in the genetic evaluation of foetal growth and cow fertility is evaluated.

We hope that this issue of **Dairy Research Review** is informative and thought-provoking. As ever, we look forward to receiving your comments and suggestions.

Kind regards

**Hamish Newton**

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

## Predicting intramammary infection status at drying off using indirect testing of milk samples

**Authors:** Gohary K & McDougall S

**Summary/comment:** This was a pilot study conducted on three autumn calving herds in the Waikato region to evaluate the potential to use either the Rapid Mastitis Test (RMT, or California Mastitis test) or electrical conductivity tests to identify cows as infected with a mastitis pathogen at drying off. The rationale was to see if these tests could be used to instead of herd test data to make treatment decisions about individual cows at drying off (antibiotic dry cow therapy or teat sealant). Quarter-level milk samples (n=609) were obtained from 153 healthy cows. Culture results were the gold standard that all tests were evaluated against. This study supports the use of a threshold at the last herd test for classifying cows as infected or not. If no herd test data is available, RMT seems a better option than electrical conductivity. All the tests were better for detecting major pathogens than all pathogens (majors and minors combined). It is still contentious about whether minor pathogens are a risk factor for mastitis with a major pathogen or even protective. If you are making decisions about treatment options at drying off without the benefit of herd test data use the RMT.

**Reference:** *N Z Vet J.* 2018;66(6):312–318

[Abstract](#)



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### Sanitation of *Staphylococcus aureus* genotype B-positive dairy herds: A field study

Authors: Sartori C et al.

**Summary/comment:** This Swiss study looked at eradicating (sanitising) herds of a specific strain of *Staphylococcus aureus*. *S. aureus* GTB is a strain of *S. aureus* that has been found to be particularly contagious and associated with herd outbreaks rather than sporadic infections. The paper examined the practicalities of ridding a herd for this strain of *S. aureus* using either conventional bacteriology or real time PCR. PCR was described as having the following advantages over conventional culture: high sensitivity and specificity, a low threshold for detection, can be targeted towards a specific strain, quick turnaround time, and the need for clean sample collection rather than aseptic collection. A total of 19 herds were evaluated with 10 randomly allocated to PCR and nine to bacteriology. The sanitation process required the farmers to milk cows with a diagnosis of *S. aureus* GTB (Group 3) after cows that were clean (two consecutive negative tests) (Group 1) and after cows with unknown status (Group 2). This study demonstrated that with adherence to a strict milking order, treatment and culling, and adherence to proper milking hygiene, Swiss dairy herds can eradicate *S. aureus*. Both conventional microbiology and the PCR techniques were effective tools but the PCR technique was about a third as costly and was specific for the contagious strain of *S. aureus*.

Reference: *J Dairy Sci.* 2018;101(8):6897–6914  
[Abstract](#)

### Additive genetic and heterosis effects for milk fever in a population of Jersey, Holstein × Jersey, and Holstein cattle under grazing conditions

Authors: Saborio-Montero A et al.

**Summary/comment:** This paper examined records from 64,000 cows over 220,000 odd lactations from cows in Costa Rica to understand the effect of heterosis on the incidence of clinical milk fever. A total of 4,355 (1.95%) clinical cases of milk fever, affecting 3,469 (5.42%) cows, were reported within this population. Unsurprisingly, Jersey cows had a higher incidence of clinical milk fever than Holsteins with crossbreds intermediate. The incidence of milk fever also increased with parity. The effect of heterosis was found to be protective against milk fever (but not statistically significantly) additional to the protective effect of having an increasing percentage of Holstein parentage.

Reference: *J Dairy Sci.* 2018;101(10):9128–9134  
[Abstract](#)

### Preweaned heifer management on US dairy operations: Part II. Factors associated with colostrum quality and passive transfer status of dairy heifer calves

Authors: Shivley CB et al.

**Summary/comment:** Although most calves will be being weaned when you read this, perhaps weaning is a good time to think about what might have been done better. This paper looks at factors that influenced the quality of colostrum given to calves and the factors that influenced the level of IgG in the calves. A total of 1,972 Holstein heifer calves from 104 operations were included in the 18-month longitudinal study. The highest quality colostrum in terms of IgG came from cows that had, in the month prior to calving, been in an environment with an average temperature heat index above 70 (greater than the thermoneutral zone for mixed-age cows). Mean colostrum IgG was highest from 3<sup>rd</sup> lactation dams (heifers were not significantly different from other lactations), and colostrum IgG levels in colostrum replacer were lower than in any colostrum coming directly from cows. Perhaps the more relevant part of the paper is the factors that influence the outcome of the IgG that gets into the calf especially now that Brix testing is a well-established tool and becoming more widely used. The paper points out that the amount of passive transfer is related to the mass of IgG that the calf ingests (concentration x volume of colostrum) but that the quality of colostrum is a bigger driver of passive transfer than the volume. Calves that received heat-treated colostrum had higher IgG levels than calves that did not, possibly due to a reduced bacterial load in the colostrum not “binding up” antibodies. Twelve percent of calves in this study were defined as having failure of passive transfer (FPT). The risk factors for FPT examined were: feeding poor quality colostrum, delayed feeding of colostrum (>4 hours of age), and feeding an inadequate volume of colostrum in the first 24 hours (<3.79L). Eighty-six percent of calves defined as FPT had at least one of the risk factors described above and 42% of the FPT calves had received poor quality colostrum, which to me highlights the importance of measuring colostrum quality.

Reference: *J Dairy Sci.* 2018;101(10):9185–9198  
[Abstract](#)



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### Exposure to antimicrobials through the milk diet or systemic therapy is associated with a transient increase in antimicrobial resistance in faecal *Escherichia coli* of dairy calves

Authors: Foutz CA et al.

**Summary/comment:** This US study examined the effect of three pre-weaning calf diets on the level of antimicrobial resistance (AMR) in faecal *Escherichia coli* in calves from a convenience sample of 15 dairy farms. The three diets were: pasteurised non-saleable milk (PNM), i.e. waste milk; medicated milk replacer (MMR); and non-medicated milk replacer (NMR), which was the control. Calves were faecal sampled at weeks 1, 3, 5, and 16 of life. At weeks 1, 3, and 5, five calves in the PNM and MMR groups had greater levels of AMR measured than the control calves but by week 16 the levels of AMR were all equal between groups. It seems that once the challenge from antimicrobials in the diet is removed the susceptible *E. coli* are able to flourish and return to make up a similar proportion of the total *E. coli* as that found in the calves that were never exposed to antimicrobials in the diet. It is perhaps reassuring that the AMR patterns returned to "normal" once antimicrobial exposure stopped and it is tempting to believe that the resistant strains were already present and they just had a temporary advantage during the pre-weaning period, but it is concerning that the feeding of waste milk had the same effect as medicated milk replacer, and that while being fed the risk of potentially acquiring a resistant *E. coli* infection was increased. Something to consider if little kids are in the calf sheds next year?

Reference: *J Dairy Sci.* 2018;101(11):10126-10141

[Abstract](#)

### Changes in milk characteristics and fatty acid profile during the oestrous cycle in dairy cows

Authors: Toledo-Alvarado H et al.

**Summary/comment:** This Italian study examined the characteristics of milk for 10 days either side of oestrus, which was defined as the day of first insemination. The relationship of the oestrous cycle to milk composition and milk physical properties was assessed in over 57,000 cows. There were significant changes in the protein and fat percentages and in the make-up of the fat in the milk as well as pH, freezing point, etc. It is possible that at some stage in the future with inline milk analysis, daily milk analysis could feed into a precision farming system to either detect oestrus or identify cows that are likely to be on heat.

Reference: *J Dairy Sci.* 2018;101(10):9135-9153

[Abstract](#)

### Effect of varying prepartum dietary cation-anion difference and calcium concentration on postpartum mineral and metabolite status and milk production of multiparous cows

Authors: Diehl AL et al.

**Summary/comment:** This US study looked at two components of pre-partum diets, namely the calcium concentration and the level of dietary cation-anion difference (DCAD). It has been shown that diets with greater than 1% calcium can result in reduced dry matter intake (DMI) but this effect is not consistent. This randomised study involving 92 multiparous cows examined two calcium concentrations (1.3% and 1.8%) fed pre-calving in diets that had DCADs of either -22 or -2. Cows fed either 1.8% calcium or a diet with -22 DCAD had reduced DMI pre-calving probably associated with palatability but did not result in DMIs below those recommended by the NRC guidelines. Post-partum DMIs did not differ between pre-partum diet groups. The diets containing 1.8% calcium did result in higher plasma calcium concentration at day one post-calving but at no other point. The cows that received the DCAD -22 diet had greater milk yield from day 45 to 63 post-calving. How relevant this is to NZ pasture-based systems is open to debate as the DCADs being achieved in this paper are not likely to be achieved. I also wonder whether we can control the calcium concentration of the pre-partum diet from day to day within the limits described in this paper. Perhaps the take-home message is that pre-partum calcium on problem farms is at least partially supported by this paper.

Reference: *J Dairy Sci.* 2018;101(11):9915-9925

[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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## Genetic and nongenetic profiling of milk pregnancy-associated glycoproteins in Holstein cattle

Authors: Santos DJA et al.

**Summary/comment:** It has been suggested that the pregnancy-associated glycoproteins (PAG) could serve as an early indicator of adult performance as they may have a role in embryonic growth and development and this in turn is associated with postnatal growth and performance. This study took the milk PAG levels from milk pregnancy diagnoses over five years from 225,000 pregnancy test records. The genotype data was obtained from 1,993 embryos from the subsequent calves and there was genotype data from 359 of their dams. It is interesting to note that due to the extensive use of sexed semen in the US dairy industry only 68 male calves made it to the final dataset. The PAG levels were influenced by environmental factors, with herd the most important (a nutritional effect?), and the age of the embryo and dam at time of testing. There was some genetic control of PAG levels with 70% of that variance coming from the embryo and the remainder from the dam. There was only low correlation with the evaluated dairy traits. At this stage, it seems that PAG cannot be used for anything other than pregnancy diagnosis.

Reference: *J Dairy Sci.* 2018;101(11):9987–10000

[Abstract](#)

## Meloxicam administration either prior to or after parturition: effects on behavior, health, and production in dairy cows

Authors: Swartz TH et al.

**Summary/comment:** I assume we all accept as fact that around calving we see an increase in disease and mortality. Calving has been associated with an “uncontrolled inflammatory response”. It seems logical that treatment with a NSAID peri-calving should reduce the amount of inflammation and disease that follows. This has been tried with flunixin meglumine and it resulted in increased levels of metritis, retained foetal membranes (RFM), and reduced milk yield if given pre-calving. Treatment with flunixin pre-calving has also resulted in a five-fold increase in the number of still births compared with controls. There are numerous trials looking at using meloxicam post-calving with various benefits documented. If the inflammation is the result of parturition then administering meloxicam pre-calving could have merit. In this randomised study, cows were orally dosed with a capsule containing meloxicam 1 mg/kg either pre- (n=60) or post-calving (n=69) and the controls (n=65) got no meloxicam pre- or post-calving. Dystocia was defined as more than 70 minutes elapsing between the appearance of the amniotic sac and the delivery of the calf. In this study, meloxicam had no discernible effect on disease frequency regardless of when it was given, perhaps because it has a greater affinity for COX-2 receptors than COX-1 receptors compared with flunixin? This study also demonstrated an increase in milk yield in eutocic cows but not cows that were dystocic when meloxicam was given pre-calving. There is a quote in the paper that as male I should remember as it is probably already apparent to all mothers: “There is no such thing as an easy calving . . . just varying degrees of difficulty . . . from the dam’s perspective.” I think this paper highlights that giving meloxicam at calving should result in improved welfare and, within the limitations of this study, will not result in increased disease (RFM, metritis, etc.).

Reference: *J Dairy Sci.* 2018;101(11):10151–10167

[Abstract](#)

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## The effect of disbudding age on healing and pain sensitivity in dairy calves

Authors: Adcock SJJ et al.

**Summary/comment:** The animal welfare regulations regarding disbudding come into effect next spring so this paper regarding pain and healing of hot iron disbudding is timely. It will soon be mandatory that we manage the acute pain associated with disbudding. This paper looks at the fact that “In addition to acute pain, injury can cause prolonged inflammation that can persist until the wound is healed”. Disbudding young calves may have benefits due to less tissue having to be removed and smaller wounds leading to shorter healing times. This randomised US study looked at disbudding calves at 3 days of age and 35 days of age along with calves at these ages that were sham disbudded (n=12 per treatment). All calves received a cornual nerve block and the disbudded calves received oral meloxicam 1 mg/kg. The sham disbudded calves (using a cold iron) did not receive meloxicam. The wounds took on average 62 days to re-epithelialize and there was no difference in the time taken whether done at 3 days or 35 days. Calves disbudded had increased sensitivity to pressure on the head than sham disbudded calves, not surprisingly. Calves that were disbudded at 3 days of age were twice as sensitive to pressure on the rump up to 8 weeks post-disbudding. This suggests that calves disbudded very young may have a generalised increased sensitivity to pain. Let’s hope that the polled gene becomes more prevalent in the dairy population.

Reference: *J Dairy Sci.* 2018;101(11):10361–10373

[Abstract](#)

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