# Dairy RESEARCH REVIEW™

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## In this issue:



NEW ZEALAND VETERINARY NURSING ASSOCIATION

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# Welcome to the twentieth issue of Dairy Research Review.

This issue features two studies evaluating wound healing after disbudding, one in calves and the other in kid goats, and a study assessing the association between colostrum management and mortality rates in preweaning calves. Also included are two literature reviews that respectively provide recommendations for diagnostic testing for failure of transfer of passive immunity in dairy calves and testing and control of bovine viral diarrhoea in NZ pastoral production systems.

We hope that the learnings from this issue of **Dairy Research Review** will be helpful in your clinical practice. We look forward to receiving your comments and feedback.

Kind regards


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## Iron and laterality effects on healing of cautery disbudding wounds in dairy calves

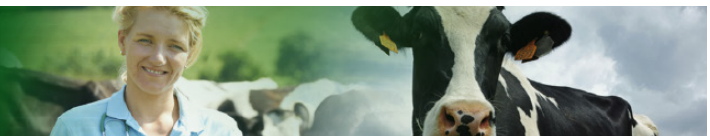
**Authors:** Adcock SJJ et al.


**Summary:** In this study, 10 Holstein calves were disbudded using an electric iron disbudder on one horn bud and a gas iron disbudder on the other. The side (left vs right) was balanced between treatments. The wounds were then scored (using defined criteria) to determine whether they healed differently on the left versus the right side of the head and hence whether the type of iron used affected wound healing. No difference between the irons was observed (wounds from both irons took 7–8 weeks to heal) indicating the need to investigate other strategies to accelerate healing.


**Comment:** There are still a few stragglers getting disbudded in our neck of the woods but for the majority of you disbudding might be a hazy memory, hopefully not due to smoke inhalation. We have taken a bit more interest in the healing of these wounds this season due in part to the new regulations and procedures/techniques we have tried. One the factors we have considered is the type of iron used and the technique the operator used to remove the bud, but we came to no conclusions. This paper has examined two different types of irons. One type of iron was used on one horn bud and the other iron on the other horn bud on each calf, and the side of the calf each iron was used on was alternated between calves. The buds were not removed and the irons were held on the bud until a "copper ring appeared". One of the irons was on for an average of 10 seconds (had a tip diameter of 17mm and edge of 1mm) and the other for 20 seconds (tip diameter of 15mm with and edge of 4mm). Despite the difference in the tips used, the time for the wounds to re-epithelialize did not differ, they both took around 54 days. At least for the two irons examined, there was no difference of healing times and perhaps that holds across all tips used in NZ? In the discussion part of this paper, it is mentioned that in human medicine burnt tissue is removed to accelerate healing. I don't know if this an argument for flicking the horn buds out or not.


***Reference: J Dairy Sci. 2019;102(11):10163–10172***


Abstract



## Associations between colostrum management, passive immunity, calf-related hygiene practices, and rates of mortality in preweaning dairy calves

**Authors:** Barry J et al.

**Summary:** This prospective study assessed colostrum and calf management together with subsequent mortality rates in preweaning calves from 47 pasture-based dairy herds. The results indicated that the IgG levels in the dairy herds was good overall and that colostrum and calf management practices were not associated with either calf serum IgG level or 28-day calf mortality rate. The quality of feeding equipment hygiene tended to worsen from the first to the final 6 weeks of the calving season.

**Comment:** When you read this, I would imagine the colostrum tanks are cleaned and put away for another year and most people will have either weaned their calves or be weaning them. This Irish study examined colostrum and calf management on 47 pasture-based herds. Colostrum quality was measured from samples taken at the individual cow level rather than what was actually fed to calves. Twenty-one percent of the samples taken had an IgG level less than recommended cut off of 50 mg/mL, so further highlighting the need in a system where colostrum is pooled to advocate for Brix testing colostrum to decide if it is "gold" or not.

Calf IgG levels were collected from calves >24 hours and <6 days of age. Unsurprisingly, there was an inverse relationship between IgG level and age at sampling and, worryingly, IgG level and herd size. Eight percent of calf samples had IgG levels <10 mg/mL – failure of passive transfer (FTP). There was an interaction between calf gender and the calf's breed (or sire type). Female dairy calves had the highest levels and female beef calves had the lowest. This might reflect the future value of these types of calves and, if it does, might demonstrate that any priority given to high-value animals (intentional of not) does result a better outcome for the high-value calves. Biologically this may not be too relevant though as the average values of IgG were still 2- to 3-times higher than the value for FPT. The mortality rate for calves with an IgG level <10 mg/mL was twice as high (but not statistically significant).

Hygiene was measured using a swab of surfaces feeders etc. and a semi quantitative assay of the amount of surface proteins was performed. The hygiene scores did deteriorate with time. There was no association between hygiene scores or hygiene practices and the serum IgG levels in this study, but do not take this as to mean hygiene is not important. Plenty of other studies have shown that high bacterial counts in colostrum are associated with increased risk of FPT and it is reasonable to think poor hygiene could result in a higher bacterial load in the colostrum being fed, especially in the colostrum storage containers. Either the colostrum fed in this study was of high enough quality or maybe surface proteins are not a great proxy for bacterial contamination. Alternatively, the hygiene practiced by the Irish was adequate.

***Reference: J Dairy Sci. 2019;102(11):10266–10276***
Abstract

## Short communication: Replacement heifer mortality from weaning until second mating in seasonal-calving, pasture-based dairy herds in New Zealand

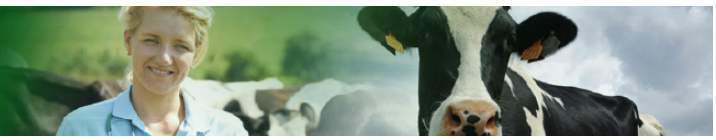
**Authors:** Mason WA et al.

**Summary:** In this prospective study, data from 3,770 heifers from 24 seasonal-calving, pasture-based dairy farms in the Waikato (n=15) and Canterbury (n=9) were analysed to determine the postnatal mortality risk of replacement heifers from weaning until the start of their second mating period. A total of 102 deaths occurred over 2,429,362 cow days at risk, with the mean time at risk being 646 days. The animal-level mortality was 1.53 deaths (95% CI: 1.26–1.86) per 100 cow years from weaning to second mating start date. Farm-level mortality rate ranged from 0 to 4.52 deaths per 100 cow years.

**Comment:** A timelier article regarding young stock this time. This study from NZ followed dairy replacements from weaning through to their second mating at about 27 months of age. This looked at mortality and did not include culls or sales. The take-home message I think is, that when the chance of death is standardised as deaths per 100 cow years (mortality rate), the risk of dying was 1.53, i.e., for every 100 cows/heifers on average 1.53 are going to die every year. It surprised me the mortality rate did not change across the study period despite there being a calving event. The other measure of mortality reported is mortality risk (number of deaths/number of calves enrolled), which was 2.7%. This is an easy number to deal with as it covers the whole study period but of course not every calf was present for the whole study period (did not make it to her second mating period due to death, or being culled or sold, etc.) making comparisons with other papers difficult. Maybe the take-home number to have floating around in your head is that if >3% of the heifers weaned die prior to their second mating there is a problem. It would be great if the authors could report at some stage the culling rates after the first mating period and at the end of the first lactation.

***Reference: J Dairy Sci. 2019 Oct 16 [Online ahead of print]***
Abstract





## Comparing effects of bovine Streptococcus and Escherichia coli mastitis on impaired reproductive performance

**Authors:** Lavon Y et al.

**Summary:** The effect of mastitis induced by gram-positive *Streptococcus* spp. and gram-negative *Escherichia coli* on impaired reproductive performance in lactating Holstein cows was investigated in two epidemiological studies (involving 52,202 cows from 178 dairy farms and 778 cows on six dairy farms, respectively). Overall, the data showed that long-term *Streptococcus* spp. mastitis disrupted fertility more than short-term acute *E. coli* mastitis, which resulted in a higher percentage of *Streptococcus* spp. mastitis cows in late lactation not conceiving due to reproduction failure.

**Comment:** Sometimes it feels all we do as dairy veterinarians is related to reproduction, mastitis, and lameness. This Israeli paper covers two of "the big three", namely, reproduction, and mastitis. It looked at cows diagnosed with mastitis prior to artificial insemination due to *E. coli* or a *Streptococcus* spp. or, if there was no *Streptococcus* spp. or *E. coli* cultured, stratified by the ICSCC into three groups. These five groups were compared with control groups. I don't think we see much (or recognise much) *E. coli* mastitis in NZ, which is good but it does appear that *Streptococcus* spp. mastitis has a more detrimental effect on reproductive performance than *E. coli*, at least in this study, which is a shame. The good news is that some other studies have shown Gram-negative mastitis to be worse for reproductive performance. So, I suppose the take-home message is that mastitis is bad regardless of the aetiology. It does seem that mastitis associated with *Streptococcus uberis* results in a longer duration of inflammation both before and after clinical signs are apparent. Mastitis cases reported in this paper, if they occurred before the resumption of cycling post calving, delayed the onset of cycling, which likely accounted for most of the poor reproductive performance compared with control cows. When mastitis occurred once a cow had resumed cycling, the reduced reproductive performance might be explained by "impairment of ovarian follicular functioning".

***Reference: J Dairy Sci. 2019;102(11):10587–10598***
Abstract

## Meloxicam affects the inflammatory responses of bovine mammary epithelial cells

**Authors:** Caldeira MO et al.

**Summary:** These researchers investigated the effects of meloxicam on the immune response of bovine mammary epithelial cells (MEC) with or without simultaneous immune stimulation by pathogen-associated molecular patterns of common mastitis pathogens. The results showed that meloxicam had clear dose-dependent effects on the immune response of MEC to pathogen-associated molecular patterns of common mastitis pathogens via inhibition of increased expression of important factors involved in inflammation. Additionally, meloxicam demonstrated detrimental effects on cell viability.

**Comment:** MECs grown in the lab were challenged with lipopolysaccharides from *Escherichia coli* or lipoteichoic acid from *Staphylococcus aureus* in differing concentrations of meloxicam. The mRNA for a range of inflammatory markers was then measured. The addition of meloxicam resulted in reduced mRNA expression of key inflammatory mediators. It seems plausible that *in vivo* the inflammatory reaction to mastitis will be reduced by the addition of meloxicam to a treatment regimen, which is what I like to believe we see clinically. I was hoping that this paper may have shed some light on the reasons behind the positive effect on reproduction when treating mastitis cases with meloxicam but apart from reduced production of the mRNA for prostaglandin E this was not discussed. Interestingly, *in vitro*, meloxicam did result in less cell viability, whether this happens *in vivo* I don't know, but no clients have reported to me "more light quarters" after using meloxicam as part of their mastitis treatment protocol.

***Reference: J Dairy Sci. 2019;102(11):10277–10290***
Abstract

## Kinetic effect of different ground conditions on the sole of the claws of standing and walking dairy cows

**Authors:** Oehme B et al.

**Summary:** In this study, 10 adult dairy cows were equipped with foil-based pressure sensors, under their left hind leg using a leather claw shoe, to measure the direct kinetic effects of concrete and rubber flooring on the soles of the cows' claws while standing and walking. The data showed that the mean pressure was 15.1 to 21.1% lower on rubber flooring compared with concrete. Moreover, maximum pressure loads were 30.1 to 32.7% lower on rubber flooring compared with concrete. Force-time curves of the dynamic measures showed biphasic curve progression, with local peaks at 29 and 79% of the stance phase. However, there were considerable differences in curve progression between individual cows and between the lateral and medial claws.

**Comment:** This paper confirms what we have all seen, I think. Cows like walking on rubber matting and people who milk cows are happy to stand on rubber matting in the shed as well. Cows in this study had leather boots fitted to their back feet and fitted in the soles of these boots were pressure sensors. Unsurprisingly, the lateral claws were exposed to more pressure regardless of what the cows were walking on, and if the cows were on rubber flooring there was less pressure on the feet. This technology may in the future be used to validate different preventative trimming methods for those systems where preventative trimming is a routine part of managing lameness. In our "normal" NZ systems, it probably has told us nothing that Neil Chesterton hasn't already told us.

***Reference: J Dairy Sci. 2019;102(11):10119–10128***
Abstract

## Sensitivity and wound healing after hot-iron disbudding in goat kids

**Authors:** Alvarez L et al.

**Summary:** These investigators assessed wound healing and pain sensitivity in 18 female dairy goat kids disbudded with a heated iron at 10 days of age (range: 5–15 days). Necrotic tissue detached completely from the scalp a mean of 26 days (range: 17–43 days) after the procedure, and wounds took a mean of 50 days (range: 35–63 days) to re-epithelialise. Pressure algometry showed that wounds were more sensitive at all stages of the healing process compared with re-epithelialised tissue, with caudal and middle locations being the most- and least-sensitive test sites.

**Comment:** Most of us I suspect don't deal with commercial goat farms but probably we all from time to time see the odd goat kid for disbudding. Perhaps for those of us who don't routinely deal with goats it is worth knowing the likely time for healing to occur and be able to communicate this with our clients to manage expectations. This study found the time to re-epithelisation of the wounds took on average 7 weeks (range: 5–9 weeks). The goats had increased sensitivity to pressure around the wounds for the entire healing period. As in the calf disbudding paper, the authors did not flick out the horn buds but mention evidence that regrowth of scurs was successfully prevented in 77% of goats disbudded by flicking out the bud compared with a 20% success rate if the bud was not flicked out. When disbudding the odd goat, your client needs to expect a prolonged healing period (same as calves) and additional pain relief should be considered.

***Reference: J Dairy Sci. 2019;102(11):10152–10162***
Abstract

## Fertility of fresh and frozen sex-sorted semen in dairy cows and heifers in seasonal-calving pasture-based herds

**Authors:** Maicas C et al.

**Summary:** These researchers evaluated the effect of treatment with fresh or frozen sex-sorted semen (SS) and other variables on pregnancy per artificial insemination (P/AI) in heifers (n=3,214) and lactating cows (n=5,457) from seasonal-calving pasture-based dairy herds. Overall, the results showed that frozen SS achieved greater P/AI relative to conventional semen than has been previously reported in lactating cows. Irrespective of whether the sperm dose per straw was $1 \times 10^6$ or $2 \times 10^6$, fresh SS did not achieve greater P/AI than frozen SS. The importance of using a large team of bulls for breeding management was highlighted by observations of a bull effect for all semen treatments as well as a dispatch-to-AI interval by bull interaction for fresh semen.

**Comment:** This Irish paper looked at using sexed semen that was either fresh or frozen and comparing it with fresh conventional semen in 3,000-odd heifers and 5,000 mixed-age cows. The outcome measure was P/AI at first insemination post calving. In both heifers and lactating cows, conventional semen resulted in more P/AI. Heifers that were inseminated with frozen sexed semen had lower P/AI than heifers inseminated with conventional semen. In lactating cows, any sort of sexed semen resulted in lower P/AI that conventional semen. P/AI was highest in heifers and declined with age in lactating cows so if using costly sexed semen target its use towards younger cows (in theory they are your higher genetic merit cows anyway). The authors also looked at other factors that were associated with higher P/AI in cows parity ≤2, these being >60 days in milk, having a high fertility index, and a body condition score (BCS) ≥3 (1 to 5 scale). The BCS was the most important factor. There was also variation in the P/AI when using sexed semen between bulls and within straws from the same bull. To mitigate this risk, the authors recommend using a range of bulls. The difference in P/AI between conventional semen was less than previously reported (different trial or improved technology?). In heifers, P/AI was 61% for conventional semen versus about 53% for sexed semen, so sexed semen was achieving about 87% of the pregnancies that conventional semen did. In cows, the conventional semen achieved a P/AI of 48% and the sexed semen achieved a rate about 39% so was about 80% as effective as conventional semen at getting a cow pregnant. If using sexed semen, use multiple bulls and select your winners to maximise the chances of success.

***Reference: J Dairy Sci. 2019;102(11):10530–10542***
Abstract

## A review of diagnostic tests for diagnosing failure of transfer of passive immunity in dairy calves in New Zealand

**Authors:** Cuttance EL et al.

**Summary:** This review paper critically evaluated the tests used to determine levels of IgG for their accuracy and practicality for use by veterinary practitioners to diagnose failure of transfer of passive immunity (FPT) in dairy calves in NZ. The review also attempted to establish sample sizes for determining herd-level FPT and provide recommendations for veterinary practitioners.

**Comment:** This paper helpfully summarises the abilities and limitations of the indirect tests we have available to us to diagnose failure of passive transfer. The indirect tests that are available to us are total protein (either measured, or assessed by a Brix refractometer), GGT levels, and the zinc sulphate turbidity test. Like all testing, the question you are trying to answer needs to be taken into account when deciding on the sampling and testing protocol. In the examples given, if you wanted to be 95% certain that the prevalence of FPT was within 10% of the value found, you will need to bleed over 40 calves. This is obviously useful information for survey data or research purposes but unfortunately most of the time we are looking at FPT as a contributing factor for ill thrift or disease in a calf shed. If using total protein levels or Brix to measure FTP, be aware that the levels will be elevated in dehydrated calves and the correlation between FTP and IgG weakens after 9 days of age. If trying to get a herd level diagnosis of FPT then by sampling 12 calves you can make a reasonable call if the prevalence of FPT is <20% or >20% as long as no calves or >5 calves, respectively, in the sample are diagnosed with FPT. The "water is pretty muddy" when one to four calves of the 12 sampled have FPT though. The message I took away from this paper was that testing for FPT is valuable but by itself is not a substitute for a full history and understanding of the systems and practices used, or not, that could contribute to the chances of FPT. This is a great paper to read for a bit of mental gymnastics and to get a vague idea of Bayesian statistics.

***Reference: N Z Vet J. 2019;67(6):277–286***
Abstract

## Recommendations for the testing and control of bovine viral diarrhoea in New Zealand pastoral cattle production systems

**Authors:** Gates MC et al.

**Summary:** These authors reviewed the epidemiology of bovine viral diarrhoea (BVD) in the context of NZ pastoral production systems to provide a series of simplified recommendations for the future control of BVD in beef and dairy herds. BVD continues to remain widespread in NZ. Analysis of BVD test accession data from commercial diagnostic laboratories suggests that 40.6% of dairy herds and 45.6% of beef herds tested had positive results for antibodies to the BVD virus.

**Comment:** This paper provides a good summary of BVD in NZ and the unique challenges facing our grazing systems to gain control of this disease. The testing recommendations in this paper are based on BVD control being voluntary and the focus is on finding and getting rid of individual persistently infected (PI) animals and using vaccination to prevent the creation of new PI animals in at-risk herds. The recommendations presented here will have to change if BVD eradication or control becomes compulsory and then the focus will need to change to screening herds to detect recent incursions or to find infected herds. There is a good table with the five potential pathways to introduce BVD into herd, which is worth looking at if you don't read the whole paper. A fact that I like to think I knew, but honestly had not thought through properly, was that there is no reliable test for the BVD status of the unborn calf. Consequently, a herd's infection status is by default unknown as soon as there are pregnant cows in the herd.

***Reference: N Z Vet J. 2019;67(5):219–227***
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.

### 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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