

Dairy RESEARCH REVIEW™

Making Education Easy

Issue 25 – 2021

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Welcome to the latest issue of Dairy Research Review.

Notable selections in this issue are the adoption of new technologies on NZ farms, assessment of genetic resistance to intramammary infection, determination of genetic and non-genetic factors affecting the duration of lactation in seasonally-calving cows, and herd-level associations between somatic cell counts (SCC) and economic performance.

We hope the research presented this issue of **Dairy Research Review** helps to inform your daily practice. Please keep your comments and feedback coming.

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.

Relationship of body weight at first calving with milk yield and herd life

Authors: Han L et al.

Summary: This study investigated the association of body weight (BW) at first calving (BWFC) and maturity rate (MR; BWFC as a percentage of mature BW) with first-lactation 305 days in milk yield, milk yield in the 24 months following first calving, herd life, and BW change through the first month of lactation in Holstein heifers. Based on data from daily records for a total of 2,339 cows (435,002 records), the key finding was that heifers that reach between 73% and 77% MR at first calving are able to produce more milk in their first lactation without sacrificing long-term milk yield and herd life.

Comment: This study looked at milk production in the 24 months following first calving of Holstein heifers from the universities of Pennsylvania and Florida. The BW of a heifer at first calving was her average weight between 5 and 10 days in milk, her BW change was the difference between her calving weight and her average weight between 30 and 40 days in milk, and her mature weight was her average weight at 5 to 10 days in milk when she was in her third lactation. To put these animals into some sort of context at calving, the heifers at calving averaged 547 kg or 535 kg (about 77% of mature weight) at the two study sites and 62% and 57% survived for another 24 months. I will not comment further on actual values but will on the trends found within the population studied. The hazard of being culled increased with increasing quintile of BW at first calving (the heaviest 20% at calving were 49% more likely to be culled than the lightest 20% of heifers). Similarly, the top 20% of heifers based on the percentage of their mature weight they had reached by first calving were 50% more likely to be culled than the bottom quintile for percentage of mature weight achieved by first calving. Milk yield increased with weight at calving only up until a heifer was in the 4th or 5th quintile. The heaviest heifers at calving lost 3.6% BW by 30 to 40 days in milk and lightest heifers gained 1.74%. This study suggests that heifers that have attained 73% to 77% of mature liveweight at calving will produce more milk and not compromise long-term milk production or survival. Sorry to sit on the fence but being too big or too small seems to have negative consequences (more culling or less milk), so a good compromise is to be about average.

Reference: *J Dairy Sci.* 2021;104(1):397–404

[Abstract](#)

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Genetic and nongenetic factors associated with lactation length in seasonal-calving, pasture-based dairy cows

Authors: Williams M et al.

Summary: These investigators analysed 616,350 lactation length records from 285,598 cows to quantify the genetic and non-genetic factors associated with lactation length in seasonal-calving, pasture-based dairy cows. Based on the results found, they concluded that an approach that combines improved management practices and selective breeding may be an efficient and effective strategy to increase the duration of lactations.

Comment: This Irish paper examines factors that influence lactation length in seasonally-calving cows. It has shown us that there is a genetic component to lactation length. In year-round calving systems there is a strong genetic correlation between lactation length and first service to conception interval. This might also be the case in seasonally-calving systems due to later calving cows still being dried off on a set date. Unsurprisingly Ireland cows that calved after January had shorter lactations. Possibly a function of looking at too many things and finding an effect was that cows that received veterinary assistance to calve had a 0.9 day longer lactation than a cow that had "assistance provided with some calving difficulty" and were more likely to lactate for greater than 270 or 305 days, relative to a cow with no recorded calving difficulty. Perhaps Irish vets are legends or these cows conceive later and get dried off based on predicted calving date. This study estimated that the top 20% of cows for genetic merit for lactation length will on average have a lactation 9.2 days longer than cows in the lowest 20%. While there is a genetic component to lactation length, we cannot forget that days in milk is mainly driven by calving date or conception date relative to planned start of mating.

Reference: *J Dairy Sci.* 2021;104(1):561–574

[Abstract](#)

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

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.



The effect of meloxicam on neonatal dairy calves: immunoglobulin G uptake and preweaning performance

Authors: Clark MOC et al.

Summary: This study evaluated the effects of meloxicam administered in two forms on immunoglobulin uptake, growth, and health of pre-weaned calves. The results suggest that meloxicam given at birth offers positive effects on starter intake, and possibly rumen development, of pre-weaned dairy calves. Meloxicam in pill form given prior to colostrum replacer, as compared with meloxicam mixed in solution with colostrum replacer, was associated with positive results for rumen development, as indicated by lower blood glucose levels.

Comment: We are all pretty happy using meloxicam as part of a treatment protocol for calf diarrhoea, calf respiratory disease, and calf debudding and now these researchers have looked at meloxicam immediately after birth. Meloxicam was given to 10 calves either as a pill prior to getting colostrum or to 10 calves in the colostrum. There were 10 controls. All calves in this study were defined as having adequate transfer of passive immunity. There was an outbreak of diarrhoea in the study caused by *Cryptosporidium parvum* that affected each treatment group equally (8, 9, and 8 calves in each group of 10) so I think is safe to say meloxicam at birth is not protective against Crypto. In this study, meloxicam did not increase milk replacer intake (but calves were limited to 4 litres a day) but it did show a trend for increased intake of starter meal intake over a 6-week period. Whether this is a real effect when meloxicam has a plasma half-life of 26 hours is to me questionable but maybe they were more vigorous and got onto the starter earlier/better. In support of the trend for increased starter intake being real is the finding of higher blood ketone levels in meloxicam-treated calves. The ketones in a calf transitioning from pre-ruminant to ruminant will increase as the source of energy used by the calf shifts towards volatile fatty acids (VFAs) produced by ruminal fermentation away from carbohydrates and glucose. During this time of transition, the blood glucose should decrease and β -hydroxybutyrate (a ketone from the metabolism of VFAs) should increase. There were no differences in blood glucose levels between control calves and meloxicam-treated calves though, but calves that received the meloxicam as a pill had lower glucose levels than calves that got meloxicam in the colostrum. On balance, I do not think this paper will result in me considering oral meloxicam for every new calf. I do wonder what the results might have been if there was no outbreak of Crypto though.

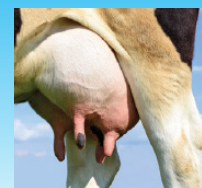
Reference: *J Dairy Sci.* 2020;103(12):11363–11374

[Abstract](#)

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Dairy farmer advising in relation to the development of standard operating procedures

Authors: Mills KE et al.

Summary: These researchers attempted to better understand what advice from researchers and veterinarians is considered when developing an on-farm standard operating procedure (SOP) and what factors affect advice adherence. Farmers (n=9) from six dairy farms and their herd veterinarians (n=5) were interviewed and participant observation undertaken. Based on the findings, it was concluded that a farm-specific SOP that actively tracks procedures is most beneficial, and that advice adherence is context dependent.

Comment: Most of us at some point will create SOPs for our clients, such as treatment protocols, or protocols for calf collection and colostrum management. These Canadian researchers looked at SOPs for what they termed "newborn calf care". They interviewed farmers and their advisors who were involved with creating SOPs. Sometimes the purpose of an SOP was to be farm specific and sometimes to reflect "industry wide standards", these later ones were not as well used. There are many of the comments from the interviews in this paper that were recorded. There was a theme that SOPs need to be simple, need to be tailored to what is already happening on the farm, pictures are good, text works for some people, and flow charts or decision trees work for others. To get buy in or adherence, it seems the reasons for the steps need to be explained to all who will use an SOP. What I took away from this is that an SOP is most likely to be adhered to if the farmer actually wants it (not told he needs it), all people who will use it understand the reasons for the steps in it, and it is tailored to what already happens or can happen on the farm. These farmers wanted simple SOPs. Pictures and flow charts also work for some people.

Reference: *J Dairy Sci.* 2020;103(12):11524–11534

[Abstract](#)

Short communication: increasing the teatcup removal settings of the last milking quarter did not reduce box time in a pasture-based automatic milking system

Authors: Silva Boloña P et al.

Summary: This study had two objectives: (i) to quantify the differences in quarter milking duration in a pasture-based automatic milking system; and (ii) to test the effect of increasing the milk flowrate at which teatcups are removed on the last milking quarter on udder milking duration, box time, milk production rate, and somatic cell count (SCC). Based on two months of data, quarter milking duration was significantly different between the quarter with the longest and the second longest milking duration within an udder. The quarter with the longest milking duration was milked an average of 49 secs longer than the quarter with the second longest milking duration. However, in 36% of the milkings, the quarter with the longest milking duration was different from that of the previous milking. No differences were observed in milking duration, box time, milk production rate, or SCC between the 30% and 50% teatcup removal setting applied to the last milking quarter.

Comment: We are all familiar with the use a defined flow rate at the cow level to trigger the removal of the teatcups by automatic cluster removers (ACRs). This study uses the quarter flow rates within a cow to decide when a cow can leave an automatic milking unit (robot milker). Removing the cups at different flow rates influences the duration of milking; as an example, it was found removing the cups at a flow rate of 0.8 kg/min instead of 0.2 kg/min reduced milking duration for a cow by 78 seconds without affecting milk yield or SCC. This study looked at stopping milking when the flow rate of the last quarter milking had fallen to either 30% or 50% of the quarter's 30 sec rolling average milk flow. The other three quarters had their cups removed when the flow rate had dropped by 30%. The last quarter milking was identified from the previous milking. This strategy did not result in reduced milking times. A strategy that uses an absolute flow rate and a set cow milking duration like we are used to with conventional milking systems with ACRs might be a better approach.

Reference: *J Dairy Sci.* 2021;104(1):532–538

[Abstract](#)

Analysis of adoption trends of in-parlor technologies over a 10-year period for labor saving and data capture on pasture-based dairy farms

Authors: Yang W et al.

Summary: These researchers conducted surveys of milking parlour technology adoption on NZ dairy farms in 2008, 2013, and 2018, with 532, 500, and 500 respondents in each year, respectively. Technologies were grouped into labour-saving (LS, such as automatic cluster removers [ACRs]) or data-capture (DC, such as in-line milk meters) categories. The likelihood of technology adoption in 2018 (and in 2013) increased by 21% (22%), 7% (68%), and 378% (165%) for LS, DC, and LS+DC technology groups, respectively, compared with 2008. Farms with LS+DC technologies also had a greater proportion of LS technologies compared with non-LS+DC farms, although this relationship declined over the 10-year study period. The use of a rotary versus herringbone parlour was estimated to be associated with 356% and 470% increase in the likelihood of adopting LS and LS+DC technologies, respectively, from 2008 to 2018. The likelihood of adopting DC and LS+DC technologies was found to be 46% and 59% greater, respectively, in the South Island compared with the base region of Waikato.

Comment: This paper examines survey data from around 500 NZ dairy farms done in 2008, 2013, and 2018 (randomly selected farms each time). Two categories of technology were examined. Firstly, labour-saving technologies such as ACRs and automatic drafting, and secondly, data capture technology such as inline milk sensors and automated heat detection. The analysis of these surveys suggests that there is greater uptake of labour-saving technologies, and that the uptake of data collection technologies seems to occur when new milking sheds are built. Having both labour-saving and data-collection technologies is more likely in the South Island and with rotary sheds, probably due to the sheds being newer. What was interesting was farms run by owner-operators had a greater intensity of labour-saving only, or labour-saving and data-capture technologies. It may be if the person writing the cheques is also the person doing the day-to-day mahi, they perceive the lifestyle benefits more intensely? I wonder if we are on the cusp of a massive uptake of wearable technology (collars or ear tags) whose use was not collected in the previous surveys (unless it fell under the heading of automatic heat detection). Many of these can be relatively easily added to farm without major infrastructure changes, especially if automatic drafting is already in place so will not be so reliant on new sheds being built and they can also be leased or used on a subscription basis so avoiding a large capital outlay up front.

Reference: *J Dairy Sci.* 2021;104(1):431–442

[Abstract](#)

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Randomized controlled trial comparison of analgesic drugs for control of pain associated with induced lameness in lactating dairy cattle

Authors: Warner R et al.

Summary: This randomised controlled trial evaluated the effect of oral meloxicam and IV flunixin meglumine on induced lameness in 48 lactating Holstein cows. Flunixin was demonstrated to have a similar effect on outcomes as meloxicam in treating mild, transient lameness with both analgesics providing effective analgesia when compared with no treatment. The authors concluded that the results support their previous research suggesting that NSAIDs are effective for providing analgesia in mild lameness.

Comment: By injecting amphotericin into the distal interphalangeal joint a transient arthritis and synovitis was induced. Six hours later cows either received a flunixin injection (two injections 24 hrs apart) or meloxicam (two oral doses 24 hours apart) or a placebo of sterile water. There was also a group that received an injection into the joint of sterile water and then 6 hrs later an injection of sterile saline (sham and placebo). The lameness induced in this study, in the authors' opinion, would not have resulted in most veterinarians or dairy producers giving analgesia to these cows. The duration of lameness induced was also short even in the cows that received no analgesia and did not allow the effect of the second dose of analgesia to be described. Both flunixin and meloxicam did provide analgesia that was not by most measures in this paper different. Due to the short duration and mild severity of lameness induced in this study I do not think this study should guide anyone's decision about whether to use flunixin or meloxicam in the field, where cows are likely to have more severe lameness that lasts longer, other than to confirm both do provide analgesia.

Reference: *J Dairy Sci.* 2021;104(2):2040–2055

[Abstract](#)

The effect of *Cryptosporidium parvum*, rotavirus, and coronavirus infection on the health and performance of male dairy calves

Authors: Renaud DL et al.

Summary: This prospective cohort study assessed the effect of bovine coronavirus (BCoV), bovine rotavirus (BRoV; groups A and B), and *Cryptosporidium parvum* on dairy calf health and performance and determined the prevalence of these pathogens. Based on results from 198 male dairy calves housed at a grain-fed veal facility, the authors concluded that the prevalence of BCoV, BRoV group A, and *C. parvum* infection was high in this population of calves and has major effects on the occurrence of diarrhoea and body weight gain. They proposed that future studies should evaluate approaches for minimising the effect of infection with these pathogens to improve dairy calf welfare, health, and productivity.

Comment: A total of 198 males calves that arrived at a single veal farm in Canada at 3 to 7 days were routinely sampled for 77 days. For the first 7 weeks, calves were penned individually but could have contact with the calf in the adjacent pen. After weaning, at 7 weeks of age, calves were put into batches of five. Faecal samples were collected upon arrival (day 0) and at days 7 and 14. This trial had a very high infection rate with 94% of calves testing positive for rotavirus at least once, 57% of calves tested at least once for *C. parvum*, and 86% tested positive for BCoV. What was going on with bacterial infections I do not know as they were not looked for. The mortality rate was 15%, and 86% of calves were treated for respiratory disease. Surprisingly, despite the high levels of infection, this study did find that growth rates were adversely affected by the number of days with diarrhoea: a 15kg difference at 77 days between calves with high levels of diarrhoea and those with a low level of diarrhoea (either <4% of days with severe diarrhoea in the first 4 weeks or less than 25% of the first 28 days with diarrhoea). I am a bit unsure what to take from this study. I think we all accept diarrhoea in calves is bad, it all comes back to prevention.

Reference: *J Dairy Sci.* 2021;104(2):2151–2163

[Abstract](#)

Genetic analysis of pathogen-specific intramammary infections in dairy cows

Authors: Narayana SG et al.

Summary: These investigators assessed genetic variation of overall and pathogen-specific intramammary infection (IMI) in clinically-healthy primiparous and multiparous Holstein cows using bacterial culture. Data and milk samples were collected over a 2-year period with the final data set containing records of 46,900 quarter milk samples from 3,382 cows from 84 dairy herds. Genetic analysis considered seven IMI traits. It was concluded that, despite low heritability estimates, there was sizeable genetic variation for pathogen-specific IMI traits, indicating that long-term direct genetic selection for pathogen-specific IMI can improve pathogen-specific IMI resistance.

Comment: This study looked at the genetic resistance to IMI and its correlation with the breeding value for somatic cell score (SCS). The correlation between resistance to IMI and SCS was highest for IMIs caused by contagious major pathogens, likely due to these IMIs typically resulting in raised SCCs for a long duration of time. There were positive and significant correlations between all pathogen group IMI traits examined (except non-aureus staphylococci) so it seems likely that selection for a reduced SCS will favour resistance to IMI, especially to IMIs caused by contagious pathogens. This paper suggests that it could be possible to develop "a pathogen-group specific udder health index". Whether this is necessary or valuable I doubt, as it could divert effort and attention away from managing our cows' exposure to pathogens. If a breeding value for SCS quietly over generations helps reduce IMIs well and good but in the meantime we should still concentrate on milking our cows well and managing their exposure to bugs as best we can.

Reference: *J Dairy Sci.* 2021;104(2):1982–1992

[Abstract](#)

Herd-level associations between somatic cell counts and economic performance indicators in Brazilian dairy herds

Authors: Gonçalves JL et al.

Summary: The objectives of this study were to create a portrait of the techno-economic status of dairy herds in a state of Brazil, primarily with respect to bulk-milk somatic cell count (BMSCC) data, and to evaluate the herd-level associations of BMSCC with various economic performance indicators. Data from 543 herds, 1,052 herd-year records in total, was used in the analysis and availability of financial information was obtained via routine monthly economic surveys. Overall, the results indicated that the lower the BMSCC, the greater the revenue, gross and net margins, and profit of dairy herds. Reduction of milk yield was the main factor associated with higher BMSCC.

Comment: Brazil is the third largest milk producer in the world behind the US and India (useful pub quiz knowledge?). In 2017, it produced about 35 billion litres and aims to produce about 41.3 billion litres in 2023. One way to increase production is to increase the national herd's health, but it needs to be demonstrated that it was an economically sound thing to do and that reducing BMSCC results in higher milk yields. The herds in this study had an average BMSCC greater than 500,000 so admittedly a bit of a different population to what we deal with. The outcomes measured (not modelled) in this study were economic performance indicators (e.g., revenue [sale of milk], gross margin, and profit). In this study there was a negative association of BMSCC and milk production. Contrary to my preconceived ideas, this paper found that as BMSCC increased total costs decreased, and the medicine costs did not vary across BMSCC. It is assumed that the lower BMSCC herds spent more on concentrates or feed. In summary, the lower the BMSCC the greater the revenue, gross and net margins, and profit. This study does not demonstrate causation only association, so it may mean farms with lower BMSCCs are managed better "across the board".

Reference: *J Dairy Sci.* 2021;104(2):1855–1863

[Abstract](#)

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