

Dairy RESEARCH REVIEW™

Making Education Easy

Issue 26 – 2021

In this issue:

- Early postpartum rumination and milk yield
- Mastitis treatment strategies
- Partial budget analysis and allocation of selective DCT
- Public perceptions of antibiotic use on US dairy farms
- Solar panels to shade dairy cows
- Bulk tank milk antibody tests for BVD
- Effect of nutritional management on milk production
- Burden of MR-NAS on German dairy farms
- Liver pathology and facial eczema
- Antimicrobial use behaviours and attitudes toward resistance



Animal Health Review publications are accredited for 0.5 points per publication with the NZVNA. More information is available at [NZVNA](http://nzvna.org.nz)

Welcome to the latest issue of Dairy Research Review.

Antimicrobial agent stewardship is the main theme in this issue. Selections include study of the effects of a mastitis treatment strategy with or without on-farm testing, a partial budget analysis of culture- and algorithm-guided selective dry cow therapy, assessment of public perceptions of antibiotic use on US dairy farms, and a systematic review of farmers' and veterinarians' antimicrobial use behaviours and attitudes toward resistance.

Other selections include an evaluation of solar panels to shade cows in a pasture-based dairy herd, bulk tank milk antibody tests for bovine viral diarrhoea, and assessing liver damage as a means of estimating prevalence of facial eczema.

We hope that you enjoy reading this issue of **Dairy Research Review**. Your feedback is important so please keep sending us your comments and feedback.

Kind regards

Hamish Newton

hamishnewton@animalhealthreview.co.nz

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

Association between early postpartum rumination time and peak milk yield in dairy cows

Authors: Peiter M L et al.

Summary: The aims of this study were to: (i) investigate the association of change in rumination time (RT) and average RT during the immediate postpartum period with peak milk yield (PMY) in dairy cows; and (ii) determine the best model based on days in milk (DIM) to evaluate this association. Cows from 33 free-flow automatic milking system farms were included. Retrospective milk production and RT data were collected for a period of 12 months. The data collected indicate that multiparous cows that increase RT to stable levels more rapidly and with greater average daily RT soon after parturition may produce more milk during their lactation. Additionally, the length of time for multiparous cows to achieve a stable RT in the early postpartum period combined with average RT during the same period may be useful in predicting their overall lactation milk production.

Comment: Rumination times post-calving were modelled against PMY in this US study. Rumination post calving declines by 70% from what was happening in the dry period on the day of calving according to this paper, whether this figure is applicable to what happens in NZ with our differing dry period management systems I do not know, but with more collars being used it will not be too hard to find out. What is interesting is that the authors state the rumination time pre-calving is associated with rumination time post-calving and that PMY accounted for most of the variability in 305d milk yield. This study attempted to see if average rumination time and change in rumination time post-partum were associated with or predict PMY. For first calvers, the rate at which rumination increased in the first week of lactation was not associated with PMY but it was in multiparous cows. The average rumination time over the first six DIM was also positively associated with PMY for mixed age cows but not for first calvers. To summarise, if mixed-age cows are ruminating well pre-calving they are more likely to ruminate well post-calving. Post-calving rumination is associated with PMY. Also associated with PMY is the rate at which rumination increases in the first week of lactation.

Reference: *J Dairy Sci.* 2021;104(5):5898–5908

[Abstract](#)

Kolibin Neo

The Optimal Booster Vaccine

Boost cows to protect calves from
• Rotavirus • Coronavirus • *E. coli*
for the **ULTIMATE COLOSTRUM**



Restricted Veterinary Medicine, ACVM Registration Number: A11242. Only available only under veterinary authorisation.



Evidence based vet medicines

0800 821 421

www.agrihealth.co.nz AgriHealth

Effects of a mastitis treatment strategy with or without on-farm testing

Authors: Griffioen K et al.

Summary: These investigators evaluated the effects of mastitis diagnosis and treatment strategies with on-farm testing, on cure, new intramammary infections (IMI), somatic cell count (SCC), and antimicrobial use, compared with farmers' current diagnosis and treatment strategies. Two randomised controlled trials were conducted on 15 herds: trial one prospectively enrolled 155 cows with clinical mastitis, and trial two cross-sectionally included 78 cows with subclinical mastitis. In both trials, cows were randomly distributed over three equal-sized groups: one using the CHROMagar Mastitis on-farm test, one using the Minnesota Easy Culture on-farm test, and a control group not using on-farm tests. Farmers decided whether or not to treat, and which antimicrobial treatment would be applied, using information available on the day of enrolment (control group), complemented with the on-farm test result one day after enrolment (both test groups). Based on the overall results, a diagnosis and treatment strategy with on-farm testing is advised in cows with clinical mastitis to enhance prudent antimicrobial use. For subclinical mastitis, a common diagnosis and treatment strategy based on on-farm testing may lead to an unnecessary increase in use of antimicrobials and should not be recommended as the common approach.

Comment: This Dutch study had two parts. This first part asked farmers that found clinical mastitis to treat as they normally would, or to use one of two on-farm culture systems and target treatment based on what the system said (no growth, Gram positive or Gram negative). The second part of the paper asked farmers to do the same but with cows with subclinical mastitis. The clinical mastitis cases were also cultured by a commercial laboratory. Roughly 20% were no growth, 60% Gram positive, and 20% Gram negative. This study showed that using on-farm diagnostics did not result in improved bacteriological cure rates. However, if on-farm diagnostics were used the treatments used were more targeted as the treatment selected was 2- to 3-times more likely to be tailored to the bug isolated by the commercial laboratory. This sounds great but the actual cure rates were no better. There was a variation between how many cases of mastitis received antibiotic treatment: 58% of cases and 80% for the two on-farm diagnostic tests compared with 86% for the decisions made without the on-farm diagnostics. Of the cases when the treatment protocol based on on-farm testing was not followed it was often culture-positive cows that did not get treated so perhaps they had clinically cured while the test was running? If a treatment decision was delayed for 24 hours in the cases that were treated according to the farmers protocol I wonder how many "self cures" might have occurred. The second part of this study looked at treatment decisions for treating subclinical cases of mastitis, if the farmer did not have data from an on-farm diagnostic test only 4% of cases were treated compared with 54% and 50% of cases where on farm diagnostics were used. Despite almost all subclinical cases being left untreated if there was no on-farm diagnostics done, the bacteriological cure was just as good if on farm diagnostics were used. This paper has made me think twice about what we hope to achieve from using on-farm diagnostics. None of the systems evaluated in this paper are to my knowledge used in NZ.

Reference: *J Dairy Sci.* 2021;104(4):4665–4681

[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.

See the VGNZ website for templates to download activity records and reflective records

<http://www.vetcouncil.org.nz/contProfDevel.php>

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.



Partial budget analysis of culture- and algorithm-guided selective dry cow therapy

Authors: Rowe SM et al.

Summary: This study used stochastic partial-budget analysis to estimate the cash impact for herds that switch from blanket dry cow therapy (BDCT) to culture- or algorithm-guided selective dry cow therapy (SDCT). As a secondary objective, a sensitivity analysis was performed to investigate the net cash impact in situations where SDCT increased clinical and subclinical mastitis risk during the subsequent lactation. The results showed that the net cash flow effect of each SDCT approach (vs BDCT) varied according to antibiotic use, drug costs, and udder health effects. Economic benefits of SDCT will be highest in herds where SDCT implementation results in substantial reductions in antibiotic use, when antibiotic treatments are relatively expensive, and when SDCT does not increase mastitis in the subsequent lactation.

Comment: This analysis used a partial budget approach to examine, using two different criteria, how to allocate SDCT. One approach was to use an algorithm-based approach to select cows (what we do in NZ) and the second approach was to select quarters for SDCT using farm culture plates (does anyone do this in NZ in seasonally calving herds?). All cows/quarters in the models got an internal teat sealant and the selected cows/quarters got DCT in addition. If the assumption was made that SDCT did not result in worse "herd level udder health", if using an algorithm to decide on SDCT at the cow level, all iterations of the model resulted in cost savings. If the culture system was used to decide on quarters to receive SDCT, savings were made 75% of the time (there are costs associated with sampling and culture). For the algorithm-based SDCT decisions the average saving per cow dried off was \$US7.85. To put this into context, the average cost of DCT was \$US14 per cow and the average cost of a case of clinical mastitis was estimated at \$US275 and \$US18.78 for subclinical mastitis, so despite being American dollars the numbers appear applicable to NZ. The second part of the study examined the cash impact if udder health was negatively affected in the first 30 days post calving. For algorithm-guided SDCT, if the amount of DCT was reduced to 20% and 40% despite increases of mastitis of 2%, SDCT still remained cost effective. None of the models took into account poorly administered teat sealants that resulted in dry period issues, which is where big losses can occur.

Reference: *J Dairy Sci.* 2021;104(5):5652–5664

[Abstract](#)

Mixing Cyclase & Novormon eCG

- Proven to be stable for 21 days
- Trusted results



Evidence based vet medicines

0800 821 421

www.agrihealth.co.nz AgriHealth

Public perceptions of antibiotic use on dairy farms in the United States

Authors: Wemette M et al.

Summary: These researchers analysed data from a national survey to assess the US public's perceptions of antibiotic use in dairy farming and how these perceptions influence purchasing decisions. The survey data suggest that the general public's decisions as consumers of dairy products are associated with demographic variables in addition to perceptions of antibiotic use and cattle treatment in dairy farming.

Comment: I think we all feel some pressure to reduce the amount of antibiotics used on our clients' farms due to increased concern about antimicrobial resistance (AMR) and the part we may play in the development of AMR. I suspect like me some of your clients will be concerned about this and others not so much, or not all. This paper tries to get a handle on the U.S public's perception of antibiotic use in dairy farms and whether those perceptions influence purchasing decisions. I am always pretty sceptical of surveys, if they are voluntary, they always have a massive risk of being biased and this paper reports on a telephone survey of 1,000 Americans to try and describe the whole of the US. Respondents to the survey were older, wealthier, and more educated, more likely to be employed and whiter than the data from the US census would suggest would be a representative sample. The four questions that this paper examines were part of a much larger survey that asked questions about things ranging from training courses in prisons to contraceptive policies. Only 51% of respondents knew antibiotics only work against bacteria. Most (90.7%) respondents believed that antibiotic use on dairy farms poses some risk to human health and 25% thought it posed a high level of threat to human health. More than two-thirds (71%) of respondents claimed they would be willing to pay more for milk from cows raised without antibiotics and 46% believed cows on organic farms were treated better. Despite my previously acknowledged scepticism of surveys these results to me suggest we need to take AMR seriously if only to keep our customers happy.

Reference: *J Dairy Sci.* 2021;104(3):2807–2821

[Abstract](#)

Evaluation of solar photovoltaic systems to shade cows in a pasture-based dairy herd

Authors: Sharpe KT et al.

Summary: This US study determined the effects on grazing cattle under shade from a solar photovoltaic system. Twenty-four crossbred cows were randomly assigned to two treatment groups: shade or no shade. Based on the study findings the researchers concluded that solar panels providing shade in pasture-based dairy systems may reduce the intensity of heat stress in dairy cows, improve the well-being of cows, and increase the efficiency of land use.

Comment: The hydro lakes are low, we all might be driving electric vehicles soon, and the co-operative difference asks us to consider heat mitigation strategies. Could cows accessing the shade under an array of solar panels be the answer? This study was in Minnesota about 45 degrees north (Oamaru is 45 degrees south). The Temperature Humidity Index (THI) in the study periods was in the mid-60s so it is possible that cows did not suffer from heat stress. The Dairy NZ website suggests once the THI is >68 there is a 10g decrease in milk solid production per day with each one unit increase in THI. Perhaps because of the heat stress cows were not exposed to, there was no significant difference in behaviour recorded. However, there were small numbers of cows in the study. The cows that had access to shade had dirtier bellies and lower legs perhaps due to damper and cooler dirt in the shade and increased crowding in the shade? There was no difference found in milk production. Cows that had access to the shade had lower temperatures in the afternoon. The economics of having your paddocks with rows of solar panels along the fence line I suspect will depend on how you use or sell the electricity. Whether solar panels are better than trees or vegetation to provide shade to reduce heat stress, or allow you to plan for adverse weather events, I do not know but they might be a part of the landscape in the future.

Reference: *J Dairy Sci.* 2021;104(3):2794–2806

[Abstract](#)

[CLICK HERE](#)

to read previous issues of Dairy Research Review

Temporal trends in bulk tank milk antibody ELISA and PCR test results for bovine viral diarrhoea in New Zealand pastoral dairy herds

Authors: Gates MC et al.

Summary: These researchers analysed data on diagnostic testing of bulk milk for bovine viral diarrhoea (BVD) performed over eight lactation seasons to describe temporal trends in bulk milk antibody ELISA and PCR testing for BVD in NZ pastoral dairy herds and to assess the use of historical accession data to predict herd-level BVD incursions. They concluded that the prevalence of dairy herds with positive bulk milk PCR test results and high S/P ratios has decreased over time, suggesting fewer herds are actively infected with BVD and that herd immunity may also be declining.

Comment: The bulk milk BVD test results (PCR and ELISA sample-to-positive [S/P] ratio) from 2010 to 2018 (the end of the 2017 season) were examined in this paper. One of the aims was to see if previous data from the farm could be used to predict the likelihood of BVD entering a herd in the last season in the data set. It turns out the BVD history of a farm provided by these tests is a poor predictor of whether BVD will turn up in a herd so we do not need to, or should not, change our messaging about biosecurity. Do everything to keep it out and continue to monitor for incursions. The good news is that over time the proportion of herds that have been positive for BVD antigen has decreased from 14.6% in 2010 to 5.6% in the 2017 season. Over this period, the number of herds monitoring has also increased from 2,786 to 6,309 (almost 60% of herds). On average, the S/P ratio drops 0.11 units a year if there is no BVD incursion. The most useful take-home message I took from this paper, to get more people monitoring, is that 50% of persistently-infected animals in NZ survive past 36 months of age (Voges 2006) and of course we have no way to measure the BVD status of an unborn foetus. The decline in the S/P ratio nationally suggests there could well be declining immunity to BVD in the national dairy herd, reinforcing the need for good biosecurity and vigilance to detect incursions if it occurs, and the screening of calves.

Reference: *N Z Vet J.* 2021;69(2):73–82

[Abstract](#)



Follow Animal Health Review on Facebook

@animalhealthreview

Independent Content: The selection of articles and writing of summaries and commentary in this publication is completely independent of the advertisers/sponsors and their products.

Privacy Policy: Research Review will record your email details on a secure database and will not release them to anyone without your prior approval. Research Review and you have the right to inspect, update or delete your details at any time.

Disclaimer: This publication is not intended as a replacement for ongoing professional education but to assist in the process. The reviews are a summarised interpretation of the published study and reflect the opinion of the writer rather than those of the research group or scientific journal. It is suggested readers review the full trial data before forming a final conclusion on its merits.

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

REGISTRATIONS OPEN
2 AUGUST 2021

NZVA and NZVNA
conference
18–20 November 2021

Te Pae Convention
Centre, Christchurch

www.nzva.org.nz/2021conference

WE ARE STRONGER
together

The effect of nutritional management in early lactation and dairy cow genotype on milk production, metabolic status, and uterine recovery in a pasture-based system

Authors: Brady EL et al.

Summary: The aim of this study was to compare the effects of nutritional management strategies and dairy cow genotype on milk production, metabolic status, and certain fertility parameters during early lactation in a pasture-based system. The results indicate that feeding cows a total mixed ration (TMR) for the first month of lactation has positive effects on milk output, metabolic status, and body condition score (BCS) profile.

Comment: Calving is imminent and so is the negative energy balance cows will experience post calving. These Irish Researchers looked at cows post calving that for 30 days post calving were allocated to either receive pasture and 3kg of concentrates (the Control feeding system) or a total mixed ration (TMR) starting at 21kg dry matter (DM) and increasing up to ad lib, which was when 10% of what was offered was refused. These diets were not equal in terms of energy etc but were devised to reflect what happens on commercial farms. There was no significant effect of feeding strategy on the milk production in the first 30 days of lactation, but there was a positive effect on production if a cow was fed the TMR (for the first 30 days only) over the first 100 days in milk (DIM). This likely represents dairy cows "prioritising" milk production in early lactation. This was reflected in the TMR-fed cows losing less BCS in the 30 days post-partum as they had higher energy intake and the same energy output in milk as the pasture-fed cows. Cows on the TMR diet also reached their BCS nadir (low point) 10 days earlier than the pasture-fed cows. The BCS loss was greater in the pasture-fed cows out to 60 DIM despite being fed the same after 30 DIM. Interestingly, and in common with other studies looking at altering feeding strategies for pasture fed cows, the time to first oestrus was not altered by the feeding regimen in the first 30 DIM. Feeding a TMR in the first 30 days resulted in less BCS loss, improved non-esterified fatty acids and β -hydroxybutyrate results, and more milk after 30 DIM, but did not change the period of post-partum anoestrus. Disappointingly the mating results were not presented in this paper, which is the real outcome I was interested in. It seems that, at a very simple level, the better you can feed your cows in the first month the better for subsequent milk production. But do not expect to see more milk in the vat in that first month, cows will produce for the first 30 days to their genetic potential regardless (to their own detriment it seems).

Reference: *J Dairy Sci.* 2021;104(5):5522–5538

[Abstract](#)

The occurrence of methicillin-resistant non-aureus staphylococci in samples from cows, young stock, and the environment on German dairy farms

Authors: Schnitt A et al.

Summary: These researchers attempted to determine the occurrence of methicillin-resistant non-aureus staphylococci (MR-NAS) on 20 German dairy farms, which were selected based on the detection of methicillin-resistant *Staphylococcus aureus* (MRSA) during previous diagnostic investigations. MR-NAS were detected on all study farms. MR-NAS was detected in 3.3% of quarter milk samples, 42.1% in bulk tank milk, 29.1% in nasal swabs from milk-fed calves, 18.3% in post-weaning calves, and 7.3% in nasal swabs from pre-fresh heifers. Nine MR-NAS species were identified: *S. sciuri*, *S. lentus*, *S. fleurettii*, *S. epidermidis*, and *S. haemolyticus* were the most common species.

Comment: I suspect by the time you read this you will have had quite a few conversations about AMR when discussing a dry cow plan with your clients. This study looked at MR-NAS on German dairy farms that were selected because they had MRSA. Most NAS are coagulase negative and this term is interchangeable with coagulase-negative staphylococci (CNS) as far as I can tell. MRSA exhibits β -lactam resistance by having a modified penicillin binding protein 2a, which is expressed by either the *mecA* or *mecC* genes. MR-NAS were detected on 19 of the 20 farms in the study. NAS that had *mecA* or *mecC* were considered to be MR-NAS. This seems on the face of it a real worry as the transfer of *mec* elements to *S. aureus* could occur by conjugation (plasmids), transduction (phages), or transformation (uptake of DNA from the environment). The good news is that the majority of *mec* types in the MR-NAS could not be characterised, but the majority of MRSA strains contained *mec* type V, so it seems that recent transmission of *mec* elements between *S. aureus* and NAS has not occurred.

Reference: *J Dairy Sci.* 2021;104(4):4604–4614

[Abstract](#)

The prevalence of gross pathological damage in the livers of dairy cattle at processing plants in autumn in the North Island of New Zealand and an assessment of the gross liver pathology score as a method for estimating the prevalence of facial eczema

Authors: Laven RA et al.

Summary: The aims of this study were to measure the prevalence of gross pathological damage in the livers of dairy cows at slaughter and to determine, using Bayesian latent class analysis, the specificity and sensitivity of gross liver pathology score (GLS) as a method for detecting moderate-to-severe facial eczema (FE) at processing plants. A total of 2,899 dairy cow livers were graded at the four plants: 700 (24.1%) livers had at least some form of gross pathology damage ($GLS \geq 1$) and 130 (4.5%) livers showed moderate, severe, or chronic gross pathology damage ($GLS \geq 3$). Estimates (posterior median) for the sensitivity and specificity of GLS to liver damage were 0.844 (95% credible interval (CrI): 0.757–0.905) and 0.932 (95% CrI: 0.866–0.973) respectively.

Comment: FE is not one of my differential diagnoses and I do not think about spore counting or trying to get a handle on what impact FE may have had on the herds I deal with, but for many of you it must be constantly near the top of your list of differential diagnoses. This study evaluated a GLS as a measure of FE damage of dairy cows at slaughter. The gross lesions were combined with histology to confirm that what was seen grossly was in fact due to FE – which it was. This study confirmed that it is possible to estimate the prevalence of liver damage in dairy cattle at slaughter. The histology from the livers in this study confirmed the gross lesions seen were due to FE and not liver fluke or brassica toxicity. An interesting finding from this study was that the correlation between the two sites within a liver that were given a histological score was less than the association between the GLS and the histological score. This reminded me that when submitting samples for histology take something that at least looks odd and hope that the part of the sample that finally gets examined by the pathologist has the lesions you hope to find. In this case it appears the histology samples (which were taken from specific anatomical locations) misdiagnosed the extent of the liver pathology. This sort of data from the works should help understand the extent to which FE has been a problem on a farm, but what we do not know is the association between liver damage at the works and that of those cows that remain in the herd or what impact on production and welfare the GLS has. At this stage I suppose it tells you how well a farmer has managed the FE challenge this year in the cows that have been culled. If there is very low prevalence of GLS in the culls at the works the culls did not make it onto the cull truck because of poor FE control.

Reference: *N Z Vet J.* 2021;69(2):113–120

[Abstract](#)

Understanding farmers' and veterinarians' behavior in relation to antimicrobial use and resistance in dairy cattle: A systematic review

Authors: Farrell S et al.

Summary: These researchers conducted a systematic review of the literature to pool and synthesize all available published data relating to the knowledge, attitudes, and perceptions of dairy farmers and veterinarians with respect to antimicrobial resistance (AMR) and their individual antimicrobial use (AMU) practices. The evidence indicates that communication, individual perceptions, and trust in one another contribute to the working relationships between farmers and veterinarians. Future research should aim to promote more frequent use of veterinary services by farmers.

Comment: This review paper aimed to collate published information on dairy farmers' and veterinarians' knowledge, attitudes, and perceptions about AMR and their AMU practices. Perhaps not surprisingly there were wide ranging views. The authors concluded that there are many factors that contribute to decisions to use antimicrobials and that addressing the perceived barriers to reduced AMU may alter decision making and reduce AMU. I think the most useful thing in this paper is the following quote: "Inappropriate AMU includes over- or under-prescribing, inappropriate dosing, incorrect treatment duration or drug choice, and unnecessary use of expensive drugs when established, cheaper, and clinically adequate drugs are available (WHO, 2000)."

Reference: *J Dairy Sci.* 2021;104(4):4584–4603

[Abstract](#)