



# Dairy Research Review™

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Issue 9 – 2017



THE SCIENCE OF HEALTHIER ANIMALS

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

This issue features papers covering a range of bovine dairying topics including the effectiveness of a footbath protocol in preventing digital dermatitis, using the Brix refractometer for assessing colostrum quality, and selecting phenotypes to genetically reduce greenhouse gas emissions. Other papers deal with the use of antibiotics for treating mastitis, strategies to gain body condition score over the dry period, and the effect of milk cessation method at dry off on milk yield and quality. In the only paper not dedicated solely to bovine dairying, NZ's use of antimicrobial agents in animal production is compared with that of other countries.

We hope that you enjoy the selections in this issue of Dairy Research Review. As ever, your feedback and comments are encouraged.

Kind regards

**Hamish Newton**

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

## Use of antimicrobials for animals in New Zealand, and in comparison with other countries

**Authors:** Hillerton JE et al.

**Summary:** These researchers estimated the use of antimicrobial drugs for food animals in NZ based on sales data reported to government (including changes over time) and compared it with that in other countries (26 European countries, Australia, Canada, and the US) and with human use. Based on the findings, they concluded that NZ was the third lowest user of antimicrobials in animal production and used much less than in human medicine.

**Comment:** The NZVA has put out to the media the aspirational goal that "By 2030 New Zealand Inc. will not need antibiotics for the maintenance of animal health and wellness". The World Health Organisation (WHO) requires that countries implement action plans that optimise the use of antibiotics. This paper helps us to understand the use of antimicrobials in veterinary medicine in NZ by quantifying the amount of antibiotics used in animals in NZ. The method used here was to get the annual sales and divide by the estimated number of animals in each category times their likely weight to give mg of active ingredient per kg of biomass. The good news is that of the 30 countries reported here we had the third lowest use of antimicrobials per kg of biomass (Norway and Iceland used less). The big users tended to have a greater proportion of the biomass coming from pigs and poultry.

Since 2005, the country's use of antibiotics has continued to increase (2.5% per year). Over the same time period, the number of dairy cattle has increased by 31.7% (biomass by 28.3%) and the number and biomass of sheep has decreased by 25.3%. The data does not tell us which species are receiving the antibiotics as most products are licensed for multiple species but the increase in the national dairy herd seems a likely reason for the increase in antimicrobial usage. One industry that is identifiable is the poultry industry as zinc bacitracin is used almost exclusively used in the poultry industry (0.4% of NZ's biomass), which accounted for 40% of the antimicrobials sold in 2014. The findings in this paper put us in good light with respect to antimicrobial use as a country but the trend for increased usage is a concern. No doubt we will come under pressure to reduce the amount of antibiotics used and perhaps in the future contribute to a national reporting system so we know what animals are receiving what antimicrobials and why (therapy, metaphylaxis, and prophylaxis).

**Reference:** *N Z Vet J. 2017;65(2):71-77*

[Abstract](#)



### The influence of 3 different navel dips on calf health, growth performance, and umbilical infection assessed by clinical and ultrasonographic examination

Authors: Wieland M et al.

Summary: The primary objectives of this randomised study were to investigate the effect of three navel dips on: i) umbilical infection; ii) health outcomes; and iii) average daily gain in new-born dairy calves. Treatment consisted of a single dip administration of the umbilicus immediately after removal of the new-born from the calving pen with one of the three navel dips. Weekly clinical examinations were carried out during the first four weeks. No difference in the effectiveness of the three treatments in the prevention of umbilical infection, pneumonia, diarrhoea, or arthritis was detected.

Comment: This study looked at the effect of three navel dips on the number of umbilical infections, number of health events (diarrhoea, pneumonia, and arthritis), and the growth rate of young calves. One dip was 7% iodine tincture, but in the US, the Drug Enforcement Agency put restrictions on the use of this solution in 2007 (not sure why but sounds mysterious) so there has been interest in other antiseptics.

The two other dips were 2% chlorhexidine and a proprietary dip that "contains isopropyl alcohol and a combination of two acid technologies". This study compared the dips in calves housed in groups like we do in NZ. Most previous research has been done on individually housed calves. There was no difference detected between the treatment for any of the outcomes measured. Interestingly though, calves from heifers had lower odds of getting an umbilical infection and heavier calves had an increased change of getting an umbilical infection. It surprised me that the presence of an umbilical cord at first examination (age 2 days) reduced the odds of getting an umbilical infection. Increased birth weight was a risk factor for pneumonia and, reinforcing the importance of colostrum management, a 1 unit increase in the serum Brix% almost halved the odds of pneumonia and reduced the odds of arthritis (0.24). In summary, it seems from this paper that it does not matter too much what navel disinfectant is used, but it does highlight the importance of colostrum management (as measured by the serum Brix%). This study was done on a 1500-cow commercial dairy farm in New York and the section of the paper on how the colostrum was stored (refrigerated until use then warmed) and the milk was treated (stored at 5 degrees then pasteurised at 72 degrees for 15s then cooled to 21 degrees then acidified to a pH of 4 to 4.5 with an organic acid) was very different to how we treat and store calf milk.

Reference: J Dairy Sci. 2017;100(1):513-524

[Abstract](#)

### Effectiveness of a standardized footbath protocol for prevention of digital dermatitis

Authors: Solano L et al.

Summary: The aim of this controlled intervention trial was to evaluate the effectiveness of a standardised footbath protocol in reducing the prevalence of active digital dermatitis (DD) lesions in lactating dairy cattle. The trial was conducted on nine farms over 22 weeks, with each farm serving as its own control. Data were collected for 10 weeks before and 12 weeks after intervention. In total, 1,978 lactating cattle were assessed biweekly for DD lesions and leg cleanliness in the milking parlour. For farms with high DD prevalence, implementation of proper footbath design and improvement of foot bathing management reduced the prevalence of active DD lesions and increased the prevalence of feet without DD lesions.

Comment: Digital dermatitis (DD) is present in NZ and we will all probably see the occasional lesion but it not as prevalent as in the intensively managed systems seen overseas. This paper used Canadian herds that had no access to pasture, so the prevalence rates reported are not what we are used to. All herds had a prevalence of DD >10%. The farms had their baseline level of DD scored prior to the installation of custom-made foot baths that were 3m long and had two channels 25cm wide for the left and right feet with a 25cm grated channel in the middle to collect the manure and were filled to a depth of 15cm. The solution used was CuSO<sub>4</sub> at 5% for four consecutive milkings over two days and continued for 12 weeks. The bath was emptied and refilled after 200 cows had passed through the bath. This protocol did reduce the prevalence of active DD lesions in the herds with highest levels of DD at the start of the trial (>15%). The farms with a starting prevalence of DD <15% did not have a great change in the amount or stage of DD. It was found that leg cleanliness or lack of was associated with a higher prevalence of DD and primiparous cows had a higher prevalence of DD than cows in lactation ≥3. It was a bit of a sobering read to see the intensive use of a foot bath that was emptied every 200 cow passes did not have a bigger effect on the prevalence of DD. Although we do have DD let us hope that our management systems do not allow the prevalence of DD to get to the levels experienced in confinement systems.

Reference: J Dairy Sci. 2017;100(2):1295-1307

[Abstract](#)

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## Anatomical characteristics of teats and premilking bacterial counts of teat skin swabs of primiparous cows exposed to different types of bedding

**Authors:** Guarin JF et al.

**Summary:** These researchers from the US evaluated associations of selected anatomical characteristics of teats with bacterial counts of teat skin of cows exposed to different types of bedding. Primarily primiparous Holstein cows (n=128) were randomly allocated to four pens within a single barn, with each pen containing a different type of bedding: new sand (NES); recycled sand (RS); deep-bedded manure solids (DBMS); and shallow-bedded manure solids over foam core mattresses (SBMS). The proportion of udders that were classified as clean (score 1 or 2) was 68, 82, 54, and 95% for cows housed in pens containing NES, RS, SBMS, and DBMS, respectively. Bacterial counts of teat skin swabs from front teats of cows in pens containing RS and SBMS were significantly lower than those of rear teats of cows in pens containing DBMS or NES. Regarding udder conformation traits, only narrower rear teat placement was positively associated with bacterial counts on teat skin.

**Comment:** This study looked at the physical characteristics of heifers' teats and what the heifers were bedded on and the bacterial populations found on the teats. As almost all mastitis comes from bacteria entering the teat canal, the bacterial population on the teats is of importance. The authors have previously reported that for front teats the diameter of the teat apex is associated with increased risk of IMI and SCC. This study is American and the culture results from mastitis cases were quite different to what we deal with (approx. one-third each of Gram negative and Gram positive cultures, and one-third no growths). In this study, teat end hyperkeratosis was not associated with the bacterial count on the teat; however, there were a low proportion of teats with rough or very rough teat ends. The amount of bacteria on the hind teats was greater than on front teats yet the number of cases of mastitis was evenly split between the front and back teats. This suggests that the incidence of mastitis is related to factors that act on the front and rear quarters differently. Differences between front and rear quarters that may explain this include udder preparation, cup slip and cluster alignment between the front and rear quarters are more important than the size of the bacterial load on teats. This is not to say that dirty teats are a good thing though but there are factors acting differently on the front and rear quarters that allow the pathogens into the quarter.

**Reference:** *J Dairy Sci.* 2017;100(2):1436–1444

[Abstract](#)

## Rapid assessment of bovine colostrum quality: How reliable are transmission infrared spectroscopy and digital and optical refractometers?

**Authors:** Elsonhably I et al.

**Summary:** The performances of the transmission-infrared (IR) spectroscopic method and digital and optical Brix refractometers for measurement of colostrum IgG concentration and assessment of colostrum quality of dairy cows were evaluated in this Canadian study. A total of 258 colostrum samples were collected from Holstein cows on 30 commercial dairy farms. Colostrum IgG concentrations of 255 samples were measured by the reference radial immunodiffusion (RID) assay and IR spectroscopy. Of these samples, the Brix scores were determined on 240 samples using both the digital and optical Brix refractometers. The main finding was that the transmission-IR spectroscopy is a rapid and accurate method for assessing colostrum quality but is a laboratory-based method. In contrast, the Brix refractometers were less accurate but could be used on-farm.

**Comment:** Once again we present a paper validating the Brix refractometer for assessing colostrum quality. This paper used radial immunodiffusion as the gold standard and used a value of <50 g/L of IgG as the cut point for classifying colostrum as poor quality. Both digital and optical Brix refractometers were evaluated along with the laboratory method of transmission-IR spectroscopy. The refractometers not surprisingly did not perform as well as the laboratory methods. The digital and optical refractometers performed similarly. As these tools are used to screen colostrum for feeding to the youngest calves, the high negative predictive values of the refractometers will ensure that relatively few poor-quality colostrum samples will be fed to the youngest calves. The flip side is that the positive predictive value is relatively low, i.e. some good colostrum will fail the test and not get fed to the baby calves but this "problem" will be more pronounced on farms with a high proportion of good colostrum giving cows.

**Reference:** *J Dairy Sci.* 2017;100(2):1427–1435

[Abstract](#)

## Invited review: Phenotypes to genetically reduce greenhouse gas emissions in dairying

**Authors:** de Haas Y et al.

**Summary:** This narrative review evaluates the advantages and disadvantages of selecting for traits for lower greenhouse gas-emitting animals to decrease the environmental footprint of dairy cattle products. It also discusses the methods for selection and consequences for these phenotypes.

**Comment:** This is an invited review looking primarily at what measure could be used if going to select for animals with the ability to produce less greenhouse gas (GHG). At present, I believe agriculture is exempt from NZ's commitment to reducing our GHG emissions but this may change. This paper states that 18% of the global anthropogenic GHG gas emissions come from the livestock sector and even in the EU, which I consider to be more industrialised than NZ, the livestock sector accounts for 13% of their GHG emissions. If at some stage there is a carbon tax placed on CH<sub>4</sub>, then this will suddenly become very relevant. This paper gives a good summary of what is currently known about methane production and factors that have been shown to alter its production. If you own low-lying coastal property, have invested in a ski field, or have an interest in ruminant nutrition then this is a good paper to read.

**Reference:** *J Dairy Sci.* 2017;100(2):855–870

[Abstract](#)

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### Antimicrobial treatment of clinical mastitis in the eastern United States: The influence of dairy farmers' mastitis management and treatment behavior and attitudes

**Authors:** Kayitsinga J et al.

**Summary:** These researchers sent a survey to 1,700 dairy farms in the US to assess both the behaviours and social variables related to antimicrobial therapy for clinical mastitis. The overall response rate was 41% and herd sizes ranged from 9 to 5,800 cows. The main finding was the need to increase acceptance of practices that are consistent with prudent antimicrobial use for the treatment of clinical mastitis on dairy farms.

**Comment:** This paper reports on a survey that asked farmers in Florida, Michigan, and Pennsylvania about the use of intramammary and systemic antibiotics for treating mastitis. There were some notable results that give us some idea of the practices used on these farms. Overall, 77% of farms used blanket dry cow therapy and 41% of farmers used a teat sealant at dry off, 78% of farms always used alcohol wipes prior to intramammary use, 29% of farmers did not have written or computer records for all cows, and 31% of farms used Gram negative bacterins to control coliform mastitis. The section on farmers beliefs about mastitis is also interesting and makes you wonder if our clients beliefs are any different. Forty-five percent of farmers agreed or strongly agreed mastitis was a problem on their farm. Over 80% of farmers believed the weather and the milking equipment had an important role in the mastitis problems on their farm. Forty-seven percent believed stray voltage played an important role and 12% thought bad luck played an important role in the mastitis problems they had. There were lots of associations between the variables reported, some seemed a bit paradoxical and some seemed to make sense but overall no clear picture emerged. What was useful was the authors kept repeating the three best practices for a mastitis therapy protocol:

1. Use records to determine cows at risk of poor therapeutic outcome.
2. Use bacteriology to determine if the causative organisms are likely to respond to therapy.
3. Development of and compliance with herd-specific mastitis therapy protocols.

Perhaps we should keep these in mind when updating our clients' treatment protocols as we move into an era of reducing antibiotic usage.

**Reference:** *J Dairy Sci.* 2017;100(2):1388–1407

[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.



### Strategies to gain body condition score in pasture-based dairy cows during late lactation and the far-off nonlactating period and their interaction with close-up dry matter intake

**Authors:** Roche JR et al.

**Summary:** This study attempted to quantify the effect of moderate or excessive metabolizable energy (ME) intakes during the far-off non-lactating period in cows that had been managed to gain or maintain body condition score (BCS) through late lactation and whether the far-off management strategy interacted with close-up level of feeding. A herd of 150 cows was randomly assigned to one of two feeding levels in late lactation to achieve a low and high BCS at the time of dry-off (BCS approximately 4.25 and 5.0 on a 10-point scale). The results showed that far-off over-feeding of ME to cows that needed to gain BCS did not affect peripartum metabolic health in grazing dairy cows. However, restricting cows to <70% ME requirements during the close-up transition period resulted in a blood profile suggestive of greater inflammation.

**Comment:** This NZ study examined the effects of different feeding levels over the dry period. Cows prior to drying off were managed to have a dry-off BCS of either approximately 4.3 or 5.0. For the following five weeks, the skinnier mob was fed to reach a BCS of 5.0 and the fatter mob fed maintenance and achieved a BCS of about 5.2. How the cows were fed during this early part of the dry period had no effect on the amount of milk, milk protein, or milk fat produced in the first 7 weeks' post calving. The second part of the experiment examined the feeding levels in the last 4 weeks of the dry period. Cows were allocated to be fed at 65%, 90%, or 120% of their requirements. Cows fed at 65% or requirements were 0.25 BCS units lighter than the other two groups by 1 week pre-calving but by 4 weeks post calving there was no difference between groups. For the first two weeks of lactation, cows fed at 65% of requirements in the last 4 weeks of the dry period produced less milk, fat, and protein than the other two feeding groups. Calcium and magnesium levels were not affected by the feeding regimen in the early dry period but the blood calcium levels at calving decreased as the feeding levels increased in the 4 weeks pre-calving. So, in summary, how the cows are fed to reach a BCS of 5.0 in the first part of the dry period is not too important. Restricting cows to 65% of requirements in the late dry period will have negative effects on health and productivity. Also, overfeeding cows in the late dry period increases the risk of hypomagnesaemia. It would appear the rapid weight gain we are getting used to seeing with fodderbeet is not detrimental.

**Reference:** *J Dairy Sci.* 2017;100(3):1720–1738

[Abstract](#)

### Effect of gradual or abrupt cessation of milking at dry off on milk yield and somatic cell score in the subsequent lactation

**Authors:** Gott PN et al.

**Summary:** This US study assessed the effect of milk cessation method (abrupt or gradual) at dry off on milk yield and somatic cell score (SCS) up to 120 days in milk during the subsequent lactation. Data from 428 cows from eight dairy herds were analysed. Abrupt cessation cows maintained the farm's regular milking schedule (2 or 3 times) through dry off and gradual cessation cows were milked once daily for the final week of lactation. Overall, the milk cessation method was not significantly associated with either milk yield or SCS in early lactation; however, the association between the milk cessation method and herd was highly significant.

**Comment:** In this study, cows were either dried off abruptly or were milked once a day (but some still came to the shed with the rest of the herd during milkings) for a week prior to drying off. The cows in this study did have to have a dry period length of between 25 and 80 days and were giving 22kg of milk a day at the end of the lactation and about half were three-times-a-day milking – so not typical of the cows we dry off. Interestingly, about 85% of the cows received an internal teat sealant at drying off. In this study, there was no effect of the method of drying off on the subsequent lactations, milk yield, or SCC but there was an interaction between herd and the dry-off method. The reason for this interaction could have been breed or some other factors. Until these factors have been identified, I see no reason to move away from the SmartSMM guidelines of taking steps to reduce yield and dry off abruptly.

**Reference:** *J Dairy Sci.* 2017;100(3):2080–2089

[Abstract](#)

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